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approach

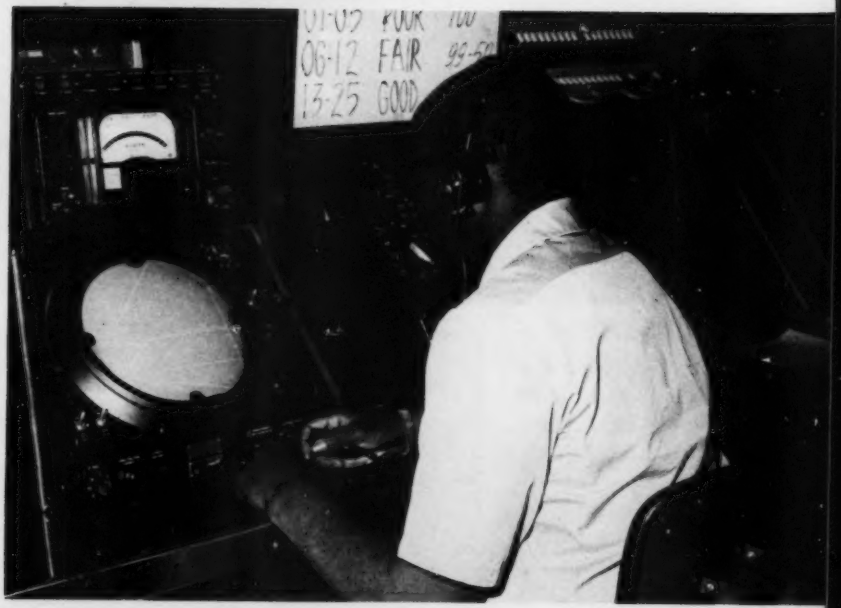
MARCH 1972 THE NAVAL AVIATION SAFETY REVIEW

TEAMWORK

THE PROPER and efficient operation of naval aviation depends upon the teamwork of its individual members. This is the basis for the oft repeated statement that *safety is an all hands job*.

This sounds reasonable, but it is hard to visualize just how much safety does depend on teamwork. The pilot depends upon maintenance to provide an aircraft which is mission ready. He depends upon operations to schedule him for missions of the number and type which are commensurate with his training, experience, current proficiency, and physical condition. Maintenance depends upon the pilot to operate aircraft properly and to make accurate yellow sheet writeups. Maintenance depends upon the CO and operations to allow proper time for careful maintenance actions.

The CO and other superiors in the chain of command depend upon maintenance and operations to perform to the best of their



ability. They depend on the pilot to keep himself in good physical condition and get adequate rest. They also depend on the pilot to follow standard procedures, use good judgment, and refrain from overextending himself on flights. In short, every member of the aviation team depends upon every other member for support.

This works out pretty well. Most of the time, the various team members work hard at fulfilling their responsibilities. The result is, normally, a smooth, efficient, and safe operation.

Unfortunately, however, there are times when one or more team members fail to fulfill their responsibility. It may be that someone defaults

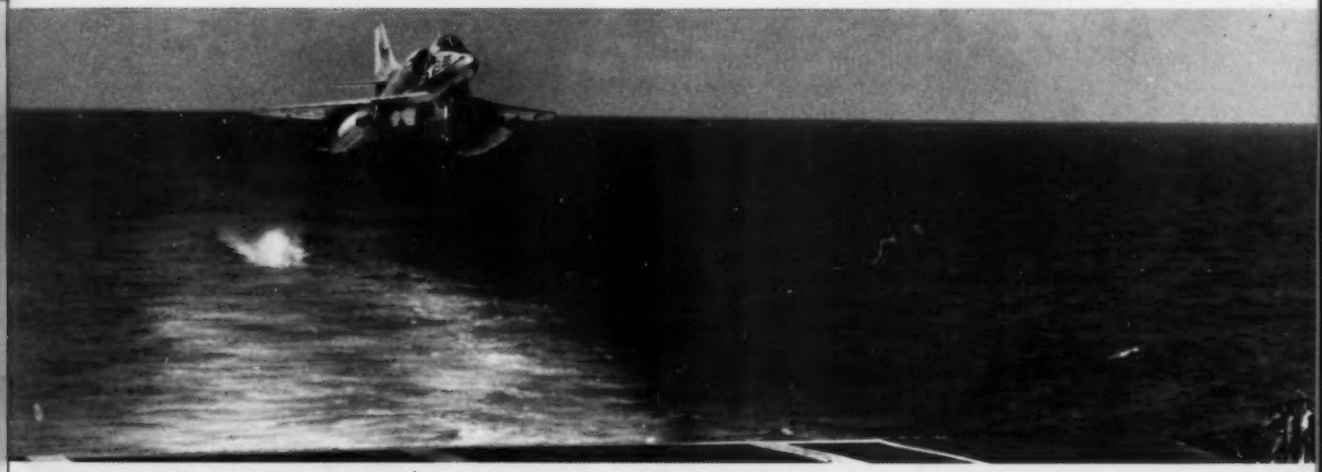
deliberately but, more likely, it is a case of simple negligence – mere failure to be careful, thoughtful, watchful, painstaking, etc.

A recent accident illustrates the interlocking and mutually supporting nature of maintenance, operations and the individual. This accident involved an F-8 aircraft. This particular aircraft had a history of recent electrical problems. Nine days before the accident, a pilot on an extended cross-country flight in the aircraft experienced electrical failure. A successful landing was made at an enroute stop using the ram air turbine for power. Both the generator and the ram air turbine were replaced by transient maintenance personnel. Thereafter, the aircraft made a short test flight without any problems. On the next leg of the cross-country flight, however, the *Crusader* again experienced electrical problems and the ram air turbine had to be deployed for landing.

Transient maintenance personnel reset the ram air turbine, and the generator checked out properly on the deck. The flight was continued to homebase, and the pilot logged 6 more hours without experiencing any further electrical problems. At homebase, the ram air turbine was reserviced and checked out properly. However . . .

On the very next flight, the F-8 again experienced electrical problems with the generator cycling continuously throughout the flight. Following this flight, the d.c. voltage regulator was replaced, the aircraft turned up, and the system checked out in accordance with the MIM. The next flight took place on the first day of a weekend drill period.

The pilot involved in the subsequent accident was not on the original flight



schedule. The primary reason being a command order to the effect that any pilot failing to fly for any 30-day period would be required to complete an OFT/WST period prior to his next flight. The pilot in question had not flown for 48 days; therefore, he was not on the original schedule. Moreover, his name was one of a number of pilots on a memorandum furnished to the operations duty officer on this date. This memo pointed out OFT/WST deficiencies, thus prohibiting their being scheduled for flight. Nevertheless, when one of the scheduled pilots failed to appear for his flight, the operations duty officer asked this pilot if he wanted to take it. He quickly answered in the affirmative and was scheduled as the flight leader of a two-plane tactics flight.

Weather at this time included overcast skies, with two layers being reported. The lower layer was thin stratus with bases ranging from 800 feet at homebase to 1900 feet to the northwest. The bottom of the layer was very ragged. The second layer of the clouds was overcast, bases at 1500 to 3000 feet and frequently merging with the tops of the lower layer. Pilot reports indicated the overall tops were at 6000 to 8000 feet with a broken cirroform layer at 25,000 feet. Visibility was about 5 miles and there was light rain falling in some parts of the local operating area.

Before takeoff, the pilot received a verbal briefing concerning the electrical problem from a previous pilot of the aircraft. He then briefed his wingman and the two planes took off at 20-second intervals on a VFR flight plan. However, IFR conditions were encountered shortly after takeoff, and it was necessary for departure control to vector the aircraft to a rendezvous above the clouds.

At 5500 feet, just as the two aircraft were joining up, the flight leader experienced a generator failure. Between departure control and the two aircraft, it was decided that the wingman would lead the flight leader back to the field on a section IFR approach.

The two aircraft began a descent, but a few minutes later the wingman (original flight leader) broadcast, "I've

lost you. I'm breaking right." About a minute later, he added, "Doing a one-eighty to your right." This was the last radio contact with the pilot.

A few seconds later approach control advised, "All right, I have you in radar contact, continue right turn heading one eight zero." About 30 seconds later approach control lost radar contact. Further attempts at radio contact were to no avail. About 10 minutes later, a telephone report of an aircraft crash was received at homebase.

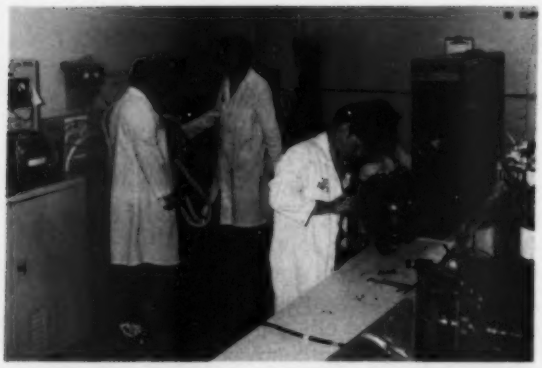
It was subsequently determined that the aircraft had crashed about 1 minute after the pilot's last transmission. The pilot was fatally injured.

The aircraft accident board concluded that the pilot probably became disoriented in the clouds, entered an unusual attitude, and found himself too low to make a safe recovery when he broke out of the clouds.

It is possible that he was attempting to maintain flight by visual means. At this point, with his attention directed toward visual references, he entered a thick overcast. Pilot disorientation followed and the aircraft developed a steep nose-down attitude in the overcast. Disorientation could have resulted from improper instrument procedures, in that the pilot failed to rely upon his instruments in an area of poor visibility. Due to the extreme low altitude and high sink rate, it was apparently too late to recover after breaking out of the overcast.

There was no evidence of any ejection attempt by the pilot. The unanswered question is "Why?" A point of note is that the pilot was found with his lap belt rocket jet fittings disconnected. This prompted the plane captain to recall that the pilot had been in a hurry to get strapped in and started. Therefore, it seems possible that the pilot merely forgot to strap in completely.

It's pure conjecture, but the accident board hypothesized that the pilot may have noticed the unsecured lap fittings while in flight and got into an unusual attitude



while attempting to attach them. It's also possible that the pilot was aware of the unconnected fittings and rejected the idea of ejection for this reason.
At this point it's worth noting that these fittings only connect the pilot to the seat pan and would not have prevented parachute deployment.
The primary cause of this accident was determined to be the pilot's disorientation which resulted in his getting into an unusual attitude from which he was unable to recover. That much is clear and understandable; however, there was a long chain of circumstances which preceded this accident which contributed to the end result. If any of these factors or circumstances had been eliminated, it is less likely that the accident would have occurred. Consider this:

- If maintenance had been able to positively (and permanently) identify and correct the electrical trouble, it is unlikely that the accident would have occurred.

- If there had been no material failure in the electrical system, it is unlikely that the accident would have occurred.

- If the operations duty officer had not scheduled the pilot, in violation of standing orders, it is unlikely that an accident would have occurred.

- If the pilot had been more aware of his limitations and more cautious about overextending himself on this flight, it is possible that the accident would not have occurred. To reiterate, the pilot had not flown for 48 days and was delinquent in OFT/WST time. The weather was such that actual IFR flight could be expected; yet, the

pilot was not well-prepared in that he had flown very little instruments, actual or simulated, during recent months. And then, there was the aircraft with its history of electrical problems to be considered by the pilot.

Taken altogether, the facts in this accident clearly show that the functions of each and every member of the naval aviation team can have an important bearing on aviation safety. In some cases, this is obvious, e.g., a GCA controller who talks an aircraft down to a landing during minimum weather conditions *knows* his performance is critical. On the other hand, a plane captain, maintenance man, schedules officer, or supervisory personnel may not always realize it, but the manner in which he performs his duties can be just as critical.

Whatever your job – give it your best. By so doing, you will be making an important contribution to the team effort and safety. ◄

Command and Supervision

By ADCS J. D. Sowers, VF-202

WHEN accidents are infrequent, the gravest enemy of safety is complacency – self-satisfaction, or resting on past laurels. The feeling that "It can't happen to me" is very often the thing that *makes it happen.* Supervisory vigilance and attention relaxes, maintenance personnel relax, and "coast" on their past good record, and pilots become overconfident.

There are two ways to dispel complacency:

- *Have an accident.*
- *Continue a more emphatic program of safety education and effort.*

Supervision means planning, directing and controlling at all levels of command. Without planning, there can be no direction or control. The path to the goal must be charted clearly, proper procedures must be established to guide the way, and everyone must know where he is going, how he is to get there, and why.

Rules and regulations set standards and establish procedures, yet they accomplish little unless personnel are properly directed in adhering to them. Only the closest supervision can insure the continued use of proper procedures on the part of people involved in the maintenance and operation of aircraft. Controlling checks must be made to determine whether or not the operation is proceeding as desired. Correction or modification must be made in time to bring operation into line with the plan when revised.

Accident prevention is a basic problem of command and supervision. How many times has it been said that, the prevention of aircraft accidents is the responsibility of every member of an organization? Every member has some degree of command and supervision, the commanding officer being the ultimate responsible agent since he is charged with the effectiveness of his command. The accident rate for any unit will vary in inverse ratio to the effort, emphasis and interest exercised by its personnel, particularly the commanding officer.

The lack of command and supervision has many manifestations:

- Sloppy preflighting
- Ineffective maintenance quality control
- Recurring aircraft ground accidents caused by carelessness and misuse of flight line vehicles
- Poor record keeping and flight planning
- Inadequate crew briefing
- Incomplete and illegible flight forms
- Hurried postflight inspections and writeups
- Poor communications techniques
- Improper inflight crew coordination and control
- Non-adherence to aircraft standard operating procedures
- Incomplete knowledge of aircraft performance capabilities and emergency procedures
- Needless and unnecessary weather penetration
- Failure to read and conform to safety digests and other safety directives – all are evidence of a poor state of supervision.

Our accidents rarely result from some great, dramatic catastrophe, but from *a series of piddling coincidences that snowball to disastrous proportions.* It's the old story of avoiding the shark but being nibbled to death by minnows. The dangers from the shark are readily apparent, and we take proper safety precautions. The minnows are relatively inoffensive, and we pay them little heed until they suddenly gang up on us with tragic results.

Courtesy COMNAVAIRESFOR/CNARESTRA Aircraft Maintenance Management Bi-Monthly Newsletter

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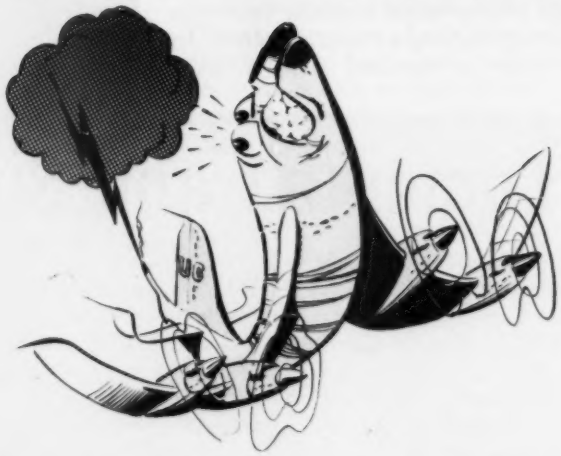
Short Snorts



Thunderstorms Will Get You

EVERYWHERE the pilots looked outside they could see massive cloud formations in varying shades of black. The only difference from wingtip to wingtip was that some of the towering cumulonimbus clouds were blacker than others. Frequent lightning discharges provided the only relief in this all-black world. Turbulence wracked the plane – keeping it constantly upset. You would think that any aircraft the size of a P-3 would ride out a storm reasonably well, but this P-3 was bouncing around in nature's rough hands just like a light aircraft.

The P-3 had departed a *SOWESTPAC* air station and was climbing through FL 170 enroute to a distant base. The PPC took a look at his radar scope and changed heading 20 degrees to starboard to fly toward the area with weakest returns. After settling momentarily on the new course a lightning flash was observed by all hands very close aboard. Soon thereafter, all hands breathed easier as the aircraft broke out into the clear. Flight characteristics and an inflight visual inspection were conducted with no discrepancies noted. Several hours later the plane landed at its destination.

Postflight investigation disclosed enough damage to down the aircraft. One of the propeller tips on the No. 4 engine had a burned area about the size of a dime, three scorched spots were found on the underside of the starboard wing, many small holes were in the trailing edge of the starboard flap and several burned rivets were found, as well as small holes in the radome and fuselage. It appears that the aircraft was struck by lightning on the prop tip after which, electrical discharges continued aft where the bulk of the discharges departed off the trailing edge of the starboard flap. *There was no indication of the static wicks receiving or dispersing any of the discharge.*

This encounter again points out the necessity of avoiding thunderstorms whenever possible. When this is not possible, minimize turbulence and icing hazards by providing a *minimum* clearance of 5000 feet above or below the freezing level; always being careful to ensure safe terrain clearance. If the turbulence doesn't throw an aircraft out of control, or if the hail doesn't break windscreens and damage engines, then lightning is most apt to cause damage. Give thunderstorms a wide berth! (Just because it's winter doesn't mean you needn't worry about thunderstorms – they're storms for all seasons.)

Launch the Angel

THE SEARCH and rescue coordinator picked up the phone and quickly copied the information he needed. It was the type of emergency which meant launching the trusty UH-34 on a mercy mission. A ranger in the nearby mountains had cut his foot with an axe and was reported to be in serious condition. The topographic chart under the Plexiglas on the SAR coordinator's desk was marked with grease crayon indicating the spot where the ranger was located.

The pilots and rescue crewmen quickly manned their helicopter

and were soon on the way. They stopped at an airport enroute to pick up the local sheriff and a radio, but the delay was only momentary. They flew directly to the area and began an approach to the closest suitable landing site about a quarter of a mile away. However, after landing, it was apparent that the rescuers would not be able to get through the heavy brush, and they knew the ranger would be unable to reach the helo.

The rescuers climbed back into the helicopter and, after looking the rugged terrain over again, the pilot elected to land in a dry riverbed rather than attempt a high hover and hoist the ranger. Altitude was over 6100 feet. In the riverbed the rescuers were successful in getting the injured man aboard. However, when the pilot tried a liftoff, the load was too heavy. So, the sheriff was left behind. On the next attempt the pilot was successful, and the injured man was flown to a nearby ranger base where medical assistance was available.

The sheriff walked a half mile to a ranger station and was driven back to his office. The helicopter crew returned to homeplate – mission completed.

After shutdown the crew discovered all four main rotor blade tips damaged. They had hit tree branches without knowing it. The yellow sheet writeup was a cursory statement that the blade tips were damaged. Maintenance experts inspected the damaged blades and determined that two could be repaired while the other two had to be replaced. In every instance when helicopter rotor blades have hit something, there is a possibility of damage to the rotor head or other rotor system components. The aircraft should be "downed" for a thorough inspection. Rigging may have to be checked and blade tracking, after repairs, is almost a certainty.

Under some circumstances the cursory writeup might have been sufficient, but generally pilots should explain, *in detail*, the circumstances which prevailed when *any* damage occurs. Yellow sheets are there for specifics. Tell it like it is – to help maintenance know just what happened. Don't let postflight business take precedence over the time necessary to spell out all the facts in summarizing what happened.

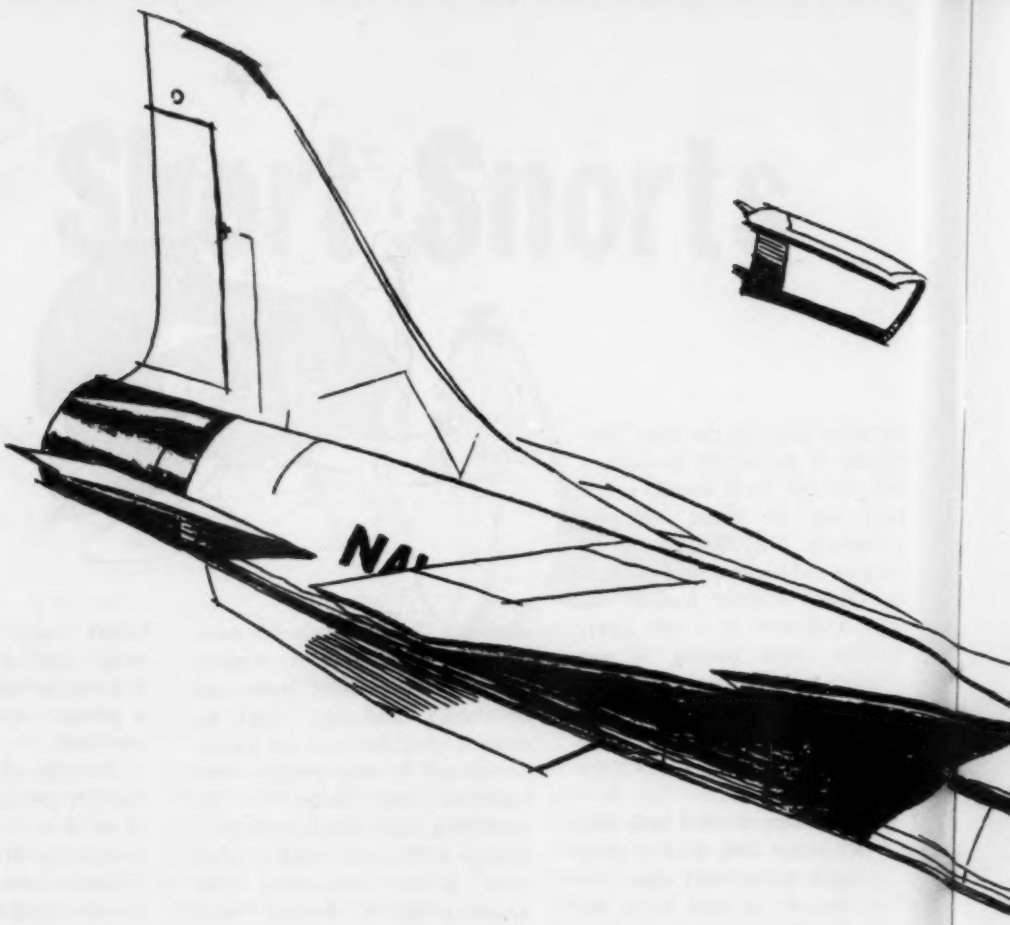
Painful Lesson

A RECENT incident happened in my squadron which could have been much more serious, and I believe others may profit by its being reported. Fortunately, the man was not injured sufficiently for a formal report – but he might have been.

The injured man, an AMEAN, was sitting on the right intake duct of an F-4 working on the rear canopy. An AE2 manned the front cockpit to check the flaps. After a cursory check of cockpit switches, he had electrical and hydraulic power applied. Unfortunately, he overlooked the inflight refueling probe switch, which was in the "extend" position. The probe door immediately opened and pinned the AMEAN's leg against the ramp. Upon hearing the trapped man's screams, the AE2 realized what was happening and quickly switched the door closed. Painful bruises were the only result.

I am using this incident; first, as a vivid reminder to all hands as to why checklists are used; and secondly, to illustrate that personnel should not be in hazardous areas when power is applied. This episode occurred near the end of the cruise with fairly experienced people (ASOs please note).

F-4 Safety Officer's Report



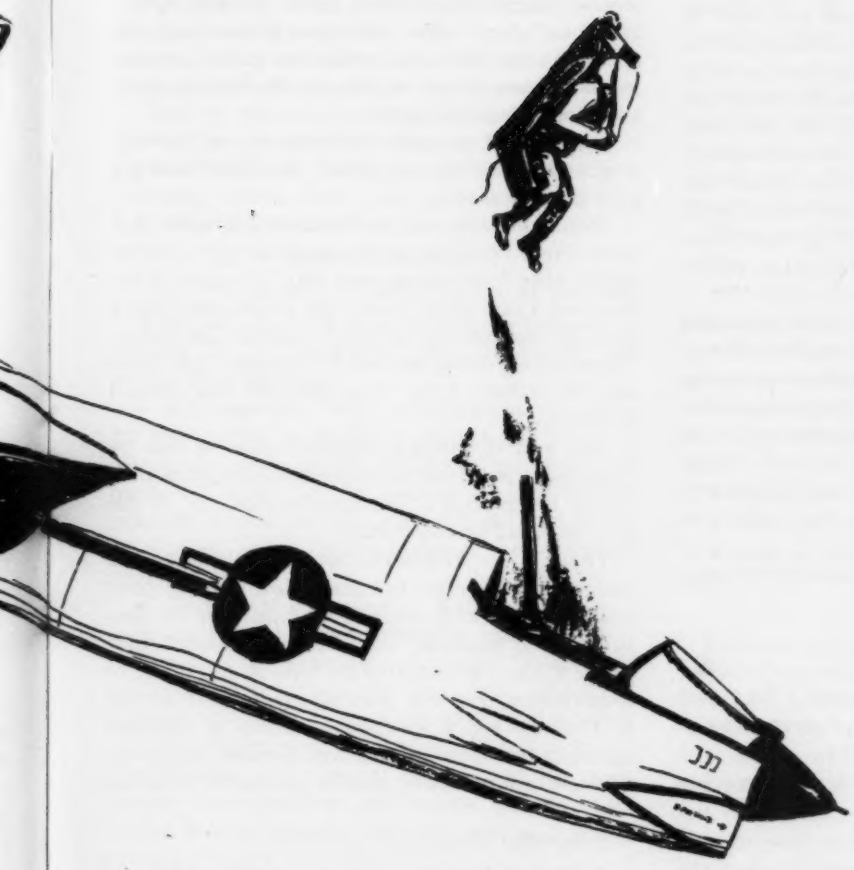
THAT EXTRA MARGIN

SO your flight plan for today doesn't include dives, rolls and assorted G-producing maneuvers . . . So why should you have to wear your anti-G suit?

Well, with the anti-G suit, you can withstand one to two more G than you can without it. This extra margin can mean the difference between clear vision and grayout . . . between grayout and blackout . . . between landing safely to collect your flight pay and an insurance payoff to your estate.

"Antiblackout suits shall be worn and connected in aircraft equipped for their use on all gunnery, dive bombing, rocket, strafing, air combat maneuvering and acrobatic flights, and on all other flights where high G forces may be encountered." That's the way General NATOPS, OPNAVINST 3710.7F, puts it, and it makes sense.

In addition to the protection the suit gives you against expected and unexpected positive G forces and their results (grayout, blackout and unconsciousness), there are other benefits from wearing an anti-G suit: 1) The suit reduces fatigue under sub-blackout accelerations. This is especially effective at high altitude where the factors of mild hypoxia, lowered pressures, and acceleration may be cumulative. 2) Pressurizing the suit for a quick "massage" provides relief for leg stiffness and



(anti-G suit). illus 10-13

physical tension in a cramped cockpit. 3) If you find yourself in a water survival situation, you can orally inflate your anti-G suit for bonus buoyancy. 4) And finally, the suit can provide you with an indication of the acceleration to which the aircraft is being subjected.

For Want of a Suit

Here's a case in which an anti-G suit might have changed the outcome.

An F-8E pilot, who was not wearing an anti-G suit on a ferry flight, blacked out in an emergency pullout from an unplanned high speed dive. When he "came to," he found himself in uncontrolled flight and ultimately ejected at an extremely low altitude, sustaining major injuries.

The accident board noted the pilot was not wearing the required anti-G suit and commented as follows:

"Since the pilot's ability to control the aircraft

deteriorated considerably during the initial dive recovery as a result of high G forces, it follows that if the pilot had been equipped with an operating, properly fitted anti-G suit, he might have been able to recover successfully from the initial dive."

Acceleration

From flight training, you will recall the basics of acceleration. One G is the gravitational attraction of an object toward the earth in terms of acceleration at the rate of 32 feet-per-second squared. Acceleration is the rate of change of velocity in terms of G units. The three basic types of acceleration are linear, radial and angular.[1] Radial G forces are further classified as negative and positive. A fourth type is combined acceleration, and a fifth is oscillatory acceleration. Oscillatory acceleration involves a rapidly alternating direction of motion such as in buffeting and turbulence.

Acceleration of short duration (less than one second) does not affect you because your body fluids do not have time to become displaced. A pilot experiencing 12G in a tight turn would become unconscious in two seconds. On the other hand, you can experience 12 to 15 "impact" G without harm by jumping from a height of 4 feet. You can tolerate high G forces for extremely short periods. It's the duration that makes the difference.

Besides the duration factor, other factors determining the effects of G are:

- Degree or intensity of the force.
- Rate of application.
- Area over which the force is applied. (The greater the area of the body over which a given force is distributed, the less harmful the effects.)
- Direction of the accelerative force with respect to the long axis of the body.
- State of training.

Increased weight of all parts of the body is the most obvious effect of positive acceleration. At 4G, for instance, a 200-pound man effectively weighs 800 pounds. This is the key to understanding the effects of G forces on the cardiovascular system. The stresses of acceleration produce the greatest pressures in those parts of the system which are furthest from the heart. Blood pools, and when circulation slows or ceases, you are deprived of oxygen, your vision is affected and eventually you lose consciousness.

In work done at the Naval Aerospace Medical Institute, results based on testing 1000 persons indicate the mean threshold for loss of peripheral vision is 4.1G; for blackout, 4.7G; and for unconsciousness, 5.4G. These thresholds are based on rates of onset of 1G per second.

Some personnel on the centrifuge under positive G reported impairment of vision due to "flashing lights," "fog," or "spots" before their eyes. It was found that apparently the effects of acceleration forces on vision are most pronounced in the low-illumination levels occurring during night flights.

The visual stages preceding blackout and recovery without disorientation were vividly described by the F-8 pilot discussed above.

"Before breaking out of the clouds during the high speed dive, I found the buffet range and was 'riding the buffet' when I saw rolling green hills," he writes. "I saw trees and a path which looked like a trail rather than a road. The horizon was fuzzy, and I was very disoriented. I began seeing orange and red and thought I had flown into the hillside. Later, I decided this was where I blacked out.

"My next recollection is one of quiet, at least by comparison, and I saw the airspeed indicator move from 220 to 170 knots in a continuous motion . . . " At this point he pulled the face curtain.

There's a difference between blackout and unconsciousness under G forces. When vision grays or blacks out due to G forces, your orientation for time and place is preserved, and a return to normal vision occurs in 3 to 5 seconds after the force abates. Return to consciousness, once lost, does not occur for 15 seconds to 1 minute and is accompanied briefly by complete disorientation. During this unconsciousness, dreams are common, and previously planned patterns of action are lost.

Some other effects of G forces are:

- Illusions, false perceptions and motion sickness.
- Increased response time when G increases and greater impairment when a task requires sequential movements.
- Distortion of ability to judge passage of time (not definitely proven).
- Serious degradation of performance in high G environments when task characteristics, having little effect on performance in low G environments, are changed.

Decreased Tolerance to G

Various factors can decrease your tolerance to G forces. Anything which hinders circulation, reduces arterial pressure or the cardiovascular system's protective reflexes, or interferes with the transport of oxygen in the blood will decrease tolerance to positive

[1] A special danger in angular acceleration is Coriolis vertigo, produced by motion of fluid in the semi-circular canals of the inner ear in one plane of motion and sudden movement of the head out of that plane. Steady head position should be maintained while experiencing G forces.

acceleration. "Mechanical" factors include varicose veins in the legs, large hernias, and gross hemorrhoids. Physical factors such as diarrhea, hypoxia, hangover, gastric upset, vertigo, and fever can lower G tolerance. Excessive smoking can reduce G tolerance by reducing the oxygen-carrying ability of the blood.

Psychological factors reducing G tolerance include anxiety and fatigue. On the other hand, competitive attitude, willingness to tolerate discomfort and pain, and previous acceleration experience can be positive factors.

Anything which increases blood pressure and pulse rate will increase positive G tolerance. Fear or rage, for instance, raise the blackout level, although this is extremely variable. Cold is said to increase tolerance to G by reducing skin blood flow.

Protective Measures

Protective measures for raising your G tolerance are:

- *Posture* – Leaning forward increases tolerance to positive G by decreasing the heart-to-eye and heart-to-brain distances.
- *M-1 maneuver* – The straining maneuver known as the M-1, familiar to all fighter pilots, is said to raise G tolerance by approximately 2G. The M-1 maneuver is for positive G only – not for negative G. (The Valsalva maneuver is less effective than the M-1 and if not performed prior to acceleration may produce unconsciousness.)
- *Good physical condition* – While good physical condition alone does not necessarily result in high G tolerance, in general, physical fitness and cardio-respiratory fitness are important. Illness and disorders which tend to cause general physical weakness and reduce blood pressure will decrease G tolerance.
- *Breathing 100 percent oxygen* – It has been reported that breathing 100 percent oxygen under positive pressure provides some G protection during exposure to high accelerations.[2]
- *Anti-G garments* – The most practical protection against G forces is the anti-G suit which selectively pressurizes the lower parts of your body, reduces pooling of the blood, and improves venous return to the heart. The suit can raise your G tolerance by as much as 2G.

The anti-G suit gives protection against positive radial acceleration by applying compensatory pneumatic pressure to your calves, thighs, and abdominal area. This works in three ways: 1) By increasing peripheral resistance, the inflated suit increases arterial pressure at heart level. 2) The large abdominal bladder squeezes the viscera and drives blood up into the thorax. 3) The inflated suit raises the diaphragm and thus significantly decreases the heart-eye distance.

When properly fitted and correctly used, the anti-G suit:

- Prevents slowed reactions and mental confusion resulting from prolonged exposure to low G forces.
- Materially lessens fatigue following repeated maneuvers involving high accelerations.
- Aids in holding you upright in your seat under G, allowing unobstructed vision during pullouts and tight turns.
- Raises your threshold for blackout and passout.
- Serves as a useful warning that G is being pulled.
- Acts as accessory flotation gear when inflated orally.

Be Prepared

The more you know about the effects of G, the better prepared you will be to encounter it, and with a fitted anti-G suit, you are maximally prepared. It has been said that the gravest error associated with anti-G suits is the lack of use by aircrews. Regardless of the various interpretations of General NATOPS relative to anti-G suit requirements, one fact stands out loud and clear: accidents such as this should not be needed to prove the prudence of wearing G suits. Unplanned (and uncontrollable) maneuvers do occur. This is, in fact, the logic behind the requirement in *tactical type* NATOPS to wear anti-G suits at all times.

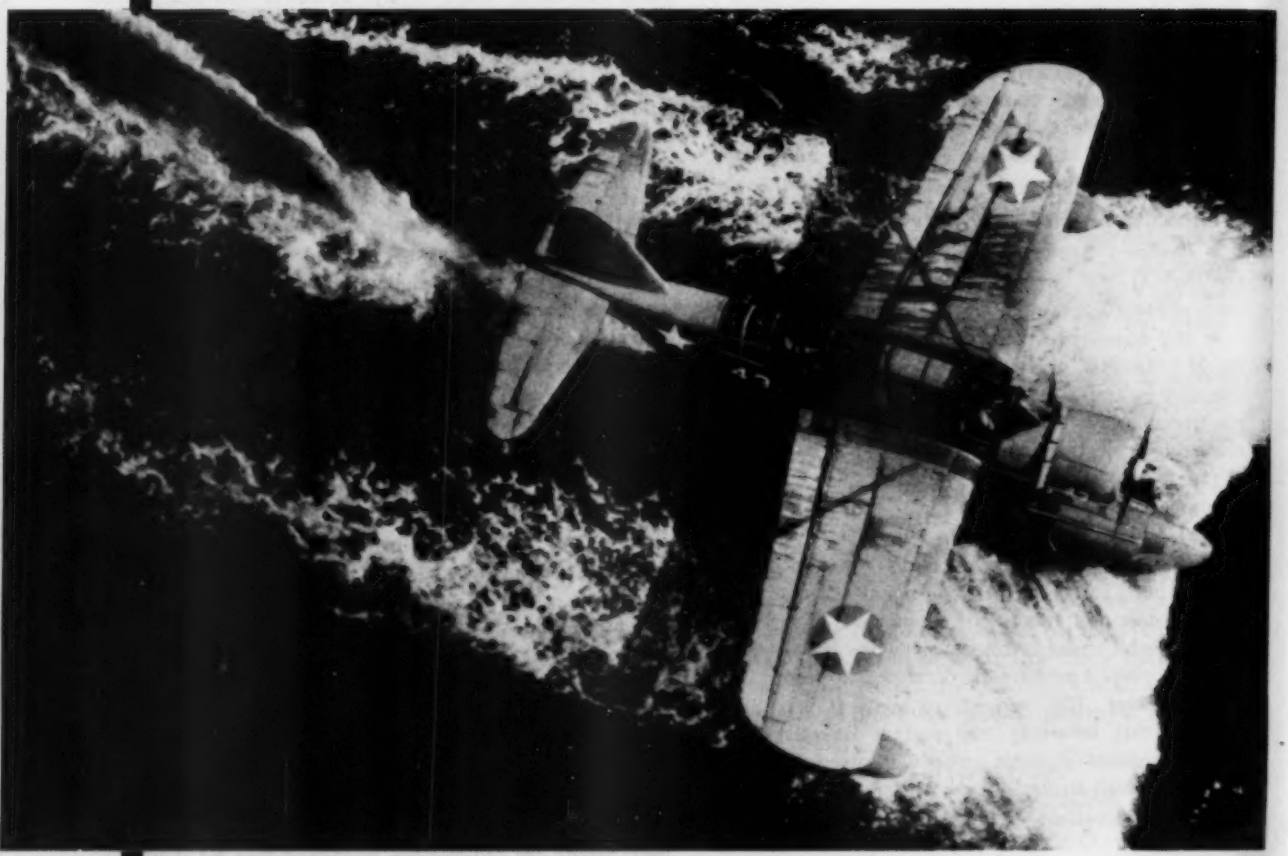
See to it that your anti-G suit is fitted *properly*, that it operates *correctly*, and then *wear it!* ◄

[2] Chambers, R.M., PhD., "Acceleration Training Principles," Naval Air Systems News, Vol. 1, No. 4, p. 4.

"MY previous survival training proved invaluable. I was surprised at how much I remembered."

A-7A pilot after ejection

A Page From History



Photos show procedure used to recover *Kingfishers*. OS2U (above) lands behind battleship, first step in recovery. At right (center) plane taxis alongside and when main float hooks onto rope sled streamed in water, plane is held in position. At right (bottom) crane lowers line to be attached to aircraft's lifting bail, located behind pilot's head.

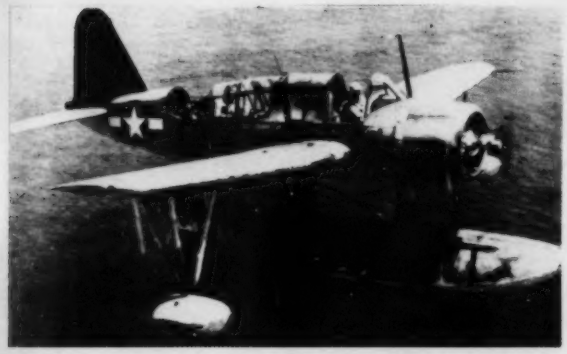
THE OS2U *Kingfisher*, known as the "Workhorse of the Fleet," contributed significantly to victory in World War II.

Designed by Rex B. Beisel of Chance Vought Aircraft Division of the United Aircraft Corporation, the two-seat scout observation monoplane was the first single-wing aircraft to be catapulted from ships.

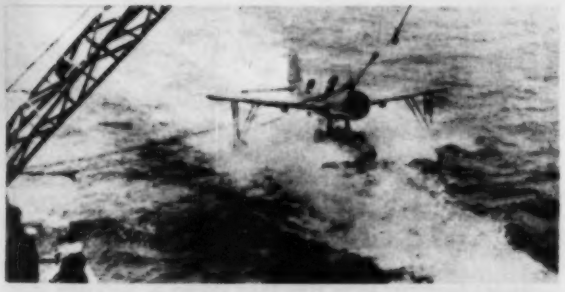
Kingfishers were stationed on battleships and cruisers for a variety of duties. USS NORTH CAROLINA (BB-55) at one time had a complement of three OS2Us. Now moored at Wilmington, North Carolina, as an historical monument, this famous battleship boasts a restored *Kingfisher* as one of its prize attractions.

OS2U Kingfisher

WW II photo shows *Kingfisher* heading inland at an enemy position where the pilot will observe shore bombardment.



One of the USS NORTH CAROLINA's *Kingfishers* in flight. Dots on starboard leading edge were painted on to appear that aircraft had wing machine guns.



Missions performed by the OS2U were spotting for naval gunfire, reconnaissance, anti-submarine patrol, shipping attack, and liaison. There were also frequent missions of rescue duty, picking up pilots who had been downed by enemy fire or by malfunctioning aircraft.

Several famous rescue missions were carried out by *Kingfishers*. One of the most thrilling of these is recounted in an historical booklet published by the USS NORTH CAROLINA battleship commission. Here's the story:

Rescue at Truk

The Japanese fortress of Truk in the Caroline Islands was scheduled to be destroyed in April of 1944 as the United States furthered its move across the Pacific. Task Force 58, including the "Big E" (aircraft carrier USS ENTERPRISE of WW II fame) and the "Showboat" (battleship USS NORTH CAROLINA), maneuvered to within 150 miles of the large enemy base and the first attacks were made on 29 April.

For the fighter and torpedo plane pilots of ENTERPRISE and the other carriers in the U. S. Fleet, there was little resistance by Japanese planes, but the ground fire from Truk's anti-aircraft batteries was thick and accurate.

For the airplane crews of NORTH CAROLINA, it would be a busy time, as they had been assigned the duty of rescue work to retrieve downed American pilots from the sea, using the slow-moving but agile OS2U float planes.

On the morning of 30 April, following the first day of full-scale attacks, two *Kingfisher* crews on NORTH CAROLINA were alerted to the fact that an ENTERPRISE pilot was down in the sea about 4 miles south of Truk's outer reef.

Less than an hour later, two of NORTH CAROLINA's *Kingfishers* circled over the downed *Hellcat* pilot, LTJG Bob Kanze. One of the float planes

LT Burns' *Kingfisher* in Pacific off Truk with airmen clinging to the dependable little aircraft.

immediately descended to pick him up.

LTJG J. J. Dowdle was the *Kingfisher* pilot with radioman-gunner R. E. Hill in the rear cockpit. The sea was very rough, but the small float plane managed to land safely and taxied toward Kanze, bobbing like a cork in his small yellow raft. As Kanze reached up to catch hold of the plane's wing float, his raft was swept away by a big wave. With Kanze's weight holding the wing float down, a second large wave caused the *Kingfisher* to capsize. The pilot and radioman were dumped into the drink along with Kanze.

The three recovered the liferaft while the second *Kingfisher*, piloted by LTJG John A. Burns, circled overhead. Burns, seeing what had happened, landed in the rough seas and taxied to the three men clinging to the raft.

Cautiously, Burns and his rear-seatman, Aubrey J. Gill, helped the three men onto the little plane . . . Kanze on one wing, Dowdle on the other, and Hill balancing the weight by hanging onto the fuselage. With this load, it was impossible to takeoff, so Burns carefully taxied to a rescue submarine, the USS TANG, and deposited his passengers. The TANG's guns were used to sink Dowdle's capsized *Kingfisher* to keep it from falling into Japanese hands.

Burns and Gill took off and headed east to where another plane had been reported down. The submarine had been directed to the eastern reef of Kuop Island, the outer edge of the Truk Atoll, and was underway to the scene. By the time the sub arrived, they found Burns and his *Kingfisher* loaded with people.

Gallant *Kingfisher* burns after being shelled by sub's guns to keep it from falling into enemy hands.

Burns had also been directed east and picked up downed *Hellcat* pilot LT Robert T. Barbor from the carrier USS LANGLEY. Sitting in the rear seat with Gill, Barbor's weight was just too much in the rough sea and after several attempts at getting airborne, Burns gave up the idea and decided to wait for TANG, which had radioed that it would probably take 3 hours.

This was about noon on 30 April, so the three men in

This flight of *Kingfisher* is shown in 1944 Navy photo.

the bobbing *Kingfisher* watched from the ocean as waves of American fighters and bombers hit the island fortress. The anti-aircraft fire was the heaviest of the war, and more American planes began to hit the water.

First, there was a hit on LT Robert S. Nelson's *Avenger*. He and his crew of two enlisted men ditched about 4 miles out. Within minutes, the *Avenger* of Ensign Carroll L. Farrell was also hit and his plane headed for the water. He ditched a half mile from Nelson and his crew in their yellow liferaft.

Watching this action from their drifting *Kingfisher*. Burns and Gill decided to do what they could. They taxied toward the six downed aircrewmen.

The small plane covered the distance in about 30 minutes and Burns flipped a tow line to Nelson's raft. Towing them a short distance, the *Kingfisher* taxied to Farrell and his crew of two, tossing them a second tow line.

This soon proved impractical because the backwash and spray from the prop inundated the raft crews, and towing the rafts put a terrific drag on the plane.

All six then transferred to the plane, some on the wings and others on the fuselage in an effort to maintain balance and not cause the overloaded, but game, *Kingfisher* to capsize.

Burns slowly began to taxi the plane over the rough sea to the surfaced, waiting submarine. As they approached to almost within shouting distance, there was an emergency call to TANG and it disappeared beneath the waves, promising to return quickly and pick up the seven airmen.

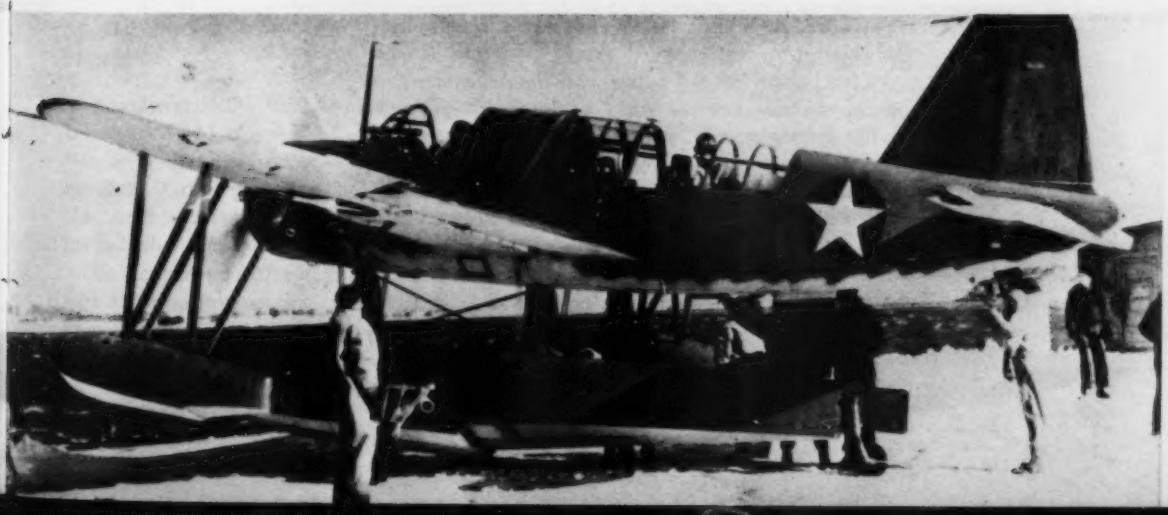
TANG had been detoured to pick up another pilot who was in the water and dangerously close to enemy positions.

Nearly 5 hours later, TANG returned to Burns' *Kingfisher*. By this time, the aircraft had begun taking on water in the main pontoon and was listing at a dangerous angle. All of the seven rescued airmen . . . Barbor, Nelson, Hranek, Tabrum, Farrell, Gruebel and Livingston . . . transferred to TANG.

Then came Burns and Gill as they had to abandon the gallant little plane. Before leaving the scene, the sub's guns were once again used to destroy an aircraft to keep it from possible enemy use.

During one day of rescue duty, Burns had picked up 10 American aviators.

The TANG had picked up 22 airmen during the 2-day Truk raid, including the 10 brought to her by the NORTH CAROLINA's *Kingfisher!*



What goes up must come down.
But a helicopter has its own peculiar way in . . .

Autorotat

THE HELICOPTER? Here's what Wilbur Wright once said about it . . .

"Like all novices we began with the helicopter (in childhood) but soon saw it had no future and dropped it. The helicopter does, with great labor, only what the balloon does without labor, and is no more fitted than the balloon for rapid horizontal flight. If its engine stops it must fall with deathly violence, for it can neither float like a balloon nor glide like an airplane. The helicopter is much easier to design than an airplane, but it is worthless when done." – 15 January 1909.

illus 18-22

Time has proved that Mr. Wright badly underestimated the potential of the helicopter. We don't have space enough to discuss all the flaws in his assessment of rotary wing aircraft, but we would like to talk about what happens to a helicopter when its engine does quit. Contrary to Wilbur's opinion, it does not "fall with deathly violence." In a helicopter, there's a region of flight between power failure and landing called *autorotation*, and it is this region we would like to discuss.

The principles involved are learned so well that the percentage of successful actual autorotations is very high. But we still see occasional accidents caused by problems which turn up on the way down after an engine failure – accidents that should never have occurred. Part of the problem may be a lack of understanding of what is involved in a successful autorotation.

It is easy to establish, practice, and remember rote procedures for autorotations. However, the pilot who fully understands not only the procedures but the principles behind them is better equipped to complete an actual autorotation, should he ever have to.

tion

(Reprinted from MAC Flyer, Dec 1971)

Vertical

Aerodynamically, the simplest form of unpowered helicopter flight is a vertical autorotation. Admittedly, this is rare in the real world but it will serve as an excellent starting point for our discussion. Let's assume that we have a helicopter in a vertical autorotation and see just what is happening.

To understand autorotation, we must take a close look at the airflow around the rotor blades. There is an upward flow through the rotor disc, equal to the rate of descent of the helicopter, which gives each blade a vertical wind component. There is also a wind equal to the rotational velocity of the rotor. The resultant of these two component vectors gives us the relative wind for any section of the blade.

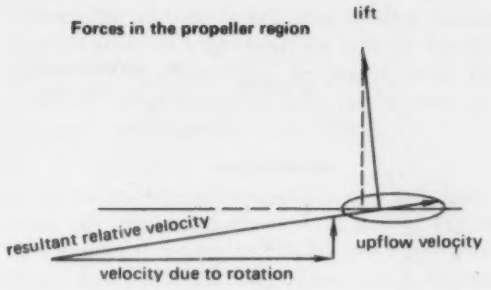


Fig. 1

Now, let's consider a blade section located near the tip of the rotor, as shown in Fig. 1. The rotational wind velocity is very high, compared to the upward velocity caused by the helicopter's descent. As a result, we have a large lifting force acting almost straight up and drag working in opposition to the direction of rotation. This portion of the blade is creating usable lift, but isn't maintaining the rotation of the rotor.

To find out why the rotor keeps turning, we must examine a section of the blade located about halfway between the hub and the tip. In Fig. 2 we see that the rotational velocity is much less, compared to the vertical wind component, than it was at the tip. The resulting lifting force is tilted in the direction of rotation, and here's our answer. This portion of the rotor blade is producing the force necessary to keep the rotor turning. Further inboard, near the rotor hub, the rotational velocity is so low that the blade is stalled and produces neither lift nor rotational force.

Each blade, then, has three aerodynamic zones, and we can consider the rotor disc, in a vertical autorotation, to be made of three separate regions. The outer ring of the disc is the propeller region and furnishes the lift necessary to keep the helicopter from becoming a free-falling object. The middle ring may be called the

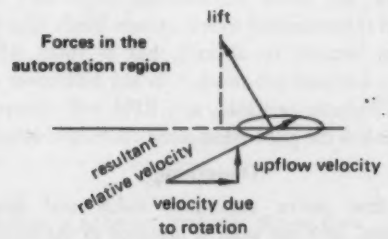
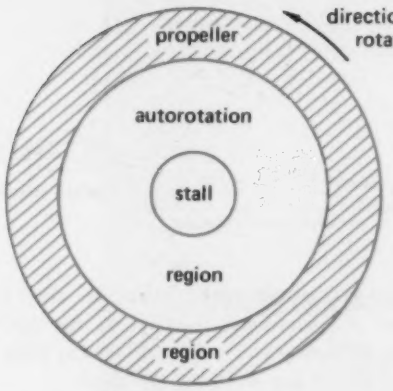
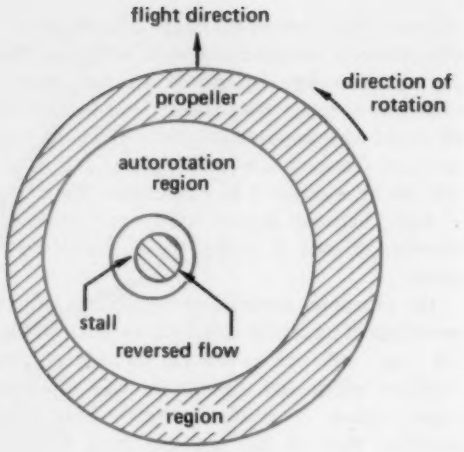


Fig. 2



Vertical autorotation

Fig. 3



Forward autorotation

Fig. 4

autorotation region and furnishes the power to keep the rotor turning, while the innermost disc is stalled and contributes nothing either way. These regions are shown in Fig. 3.

Forward

Now that we've discussed a vertical autorotation, let's give our helicopter some forward velocity and discuss a situation more closely related to the real world. Figure 4 shows the rotor disc in a normal forward autorotation. While similar to a vertical autorotation, the autorotation region of the disc has shifted to the left due to the direction of rotor rotation, and there is a new, small region of reversed flow near the center of the disc.

Normally, a given rotor system will automatically maintain a constant RPM during autorotation – it is in a stable flight condition. If an external disturbance slows the rotor, the autorotation region of the disc will automatically expand and drive the rotor back to its normal speed. If a disturbance should cause an RPM increase, the propeller region will increase in size and bring the rotor back to its normal speed. This principle is most evident in the old autogyros which, with fixed-pitch rotors, maintained a constant rotor RPM.

Actually, the stable autorotation exists only if the rotor RPM is maintained within certain limits. The limits vary from aircraft to aircraft, but if rotor RPM is allowed to decrease too much – in any helicopter – the rotor will become unstable, and RPM will continue to decrease unless the pilot takes some corrective action.

Transition

Now that we've examined stable and unstable autorotation, let's see what is involved in the transition from normal powered flight to autorotation.

During normal forward powered flight in any helicopter, the rotor blades are operating at a relatively high positive angle-of-attack, producing lift and drag, and the engine is producing torque to turn the system. The entire rotor disc is tilted forward, presenting the upper surface of the disc to the relative wind and tilting the lift vector so that part of it may be used as thrust. If the power of the engine is suddenly removed, the blades are left in a high angle-of-attack, high drag configuration, and rotor RPM will immediately begin to drop. The airflow, which was striking the top of the rotor disc, will also tend to reduce rotor RPM.

The rotational energy of the rotor system will determine the rate at which the RPM will decay. If the RPM is high, the decay rate will be slower than if the rotor was at low RPM when the power failed. An engine failure with very low rotor RPM may result in such rapid decay that the pilot is unable to react quickly enough to maintain adequate rotor speed.

Normally to enter autorotation the pilot must accomplish two things: He must lower the collective to reduce the pitch angle of the blades and maintain rotor RPM, and he must apply aft cyclic to present the lower surface of the rotor disc to the relative wind.

During the transition to autorotation, the helicopter could lose considerable altitude. The exact amount will vary with the type of aircraft involved, the pilot's technique (or lack of it), and several other factors. For a small helicopter it might take about 300 feet to establish a stable autorotation. The figure is about 500 to 600 feet in large helicopters and may be higher for aircraft with increased disc loading. With enough airspeed available when the power is cut, a pilot may enter autorotation with no altitude loss by applying aft cyclic and trading airspeed for altitude. However, conditions must be ideal, and the pilot's technique must be flawless.

Once established in autorotation, the helicopter is essentially an unpowered autogyro, with one exception. The helicopter pilot can still change the collective pitch of his blades. With this ability, he can control the percentage of the rotor disc area which is in each of the regions we discussed earlier. He can increase the size of the propeller area by increasing collective pitch, adding to his available lift but decreasing the autorotation region and sacrificing rotor RPM. Or, by decreasing collective, he can increase the size of the autorotation area, increasing RPM and losing available lift. This feature of the helicopter offers the pilot a couple of options during his autorotation and enables him to make an autorotational landing with no forward speed – something an autogyro can't do.

Range or Rate?

As we remember from basic aerodynamics, a fixed-wing aircraft has two power-off gliding speeds. For maximum gliding distance, the aircraft should be flown at a somewhat lower airspeed. A power-off helicopter operates the same way, except that rotor RPM is also a consideration.

The flight handbook will furnish specific figures for any helicopter but we can generalize by saying: "For maximum range, we want high airspeed with low rotor RPM, while for minimum rate of descent we need low airspeed with high rotor RPM." These considerations influence the pilot's actions while he is establishing autorotation after an engine failure.

If range is critical, as it would be if the pilot were trying to make it to a shoreline or reach a clear area some distance away, he must maintain airspeed while transitioning to autorotation. He would present the lower surface of the rotor disc to the relative wind less rapidly, by using minimum aft cyclic and applying it slowly.

If the pilot wants to stay airborne as long as possible to attempt restarts or prepare for the landing, he would change disc attitude rapidly and sacrifice airspeed to hold altitude, but might lower the collective pitch more slowly. If he must make any turns, he'd use the shallowest possible angle-of-bank to minimize altitude loss and conserve his time in the air.

Flare

After establishing autorotation, the helicopter pilot faces only one small problem – the landing. The success of a power-off landing in a helicopter depends on the inertia built up in the rotor system during the descent. The pilot, by increasing collective pitch at the right moment, can convert this energy to additional lift to slow his rate of descent to near zero at touchdown. Since the amount of inertial energy available depends mainly on rotor RPM, the more the better. But we have just discussed situations in which the pilot would want to descend at less than the maximum rotor RPM – to gain maximum range for instance. And even minimum rate of descent autorotations, in many helicopters, are flown at less than the maximum possible rotor RPM. How can we get maximum RPM for the landing? By flaring the helicopter. Let's take a look at what happens.

The aircraft is approaching the landing site with less than maximum allowable rotor RPM – the pilot has the collective up to some degree. At a given altitude, depending on the type aircraft and approach, the pilot coordinates aft cyclic and bottoms the collective, raising the helicopter's nose and begins a flare maneuver. This slows the helicopter's forward speed and increases the rotor blades' angle-of-attack. Or, to look at it another way, it exposes the bottom of the rotor disc more directly to the relative wind and increases the upflow of air through the rotor disc. This increases the autorotative area of the rotor disc which increases rotor RPM.

Also, in some helicopters, the law of conservation of energy helps increase rotor RPM. In the flare, the helicopter's load factor is increased. This increases the

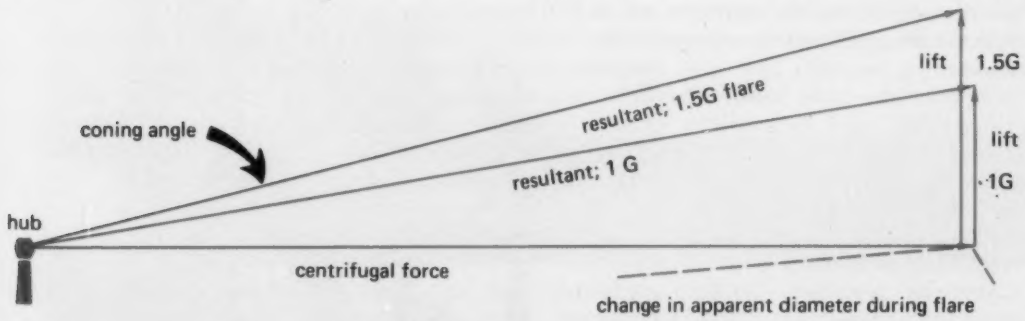


Fig. 5

apparent weight on the rotor system which responds by increasing the coning angle. Figure 5 shows that the coning angle is the resultant of centrifugal force and lift, and since lift equals weight, the apparent diameter of the rotor system decreases. Since, according to the law of conservation of energy, the total kinetic energy of the rotor system must remain constant, the increase in coning angle and decrease in diameter, forces an increase in rotor RPM. It's the same principle as when you sling a weight on a string around your finger. As the string winds itself around your finger, the diameter of the circle decreases and the RPM of the weight increases.

Touchdown

As the rotor reaches its maximum RPM in the flare, the pilot deftly levels the aircraft just above the ground with maximum rotor RPM, no airspeed, and minimum rate of descent. All that remains is to convert the energy in the rotor system to lift by increasing collective pitch as the helicopter settles to the ground. This increased collective will produce drag, slowing the rotor, but the helicopter should be on the ground before rotor RPM drops too low. If everything has been done properly, the chopper will come to rest safely on the ground with its rotor unwinding slowly.

One other type of autorotation we should mention involves an engine failure at very low altitude and low airspeed. In this situation there is not enough energy in the rotor system to establish stable autorotation, but recovery is still possible. When the engine failure occurs, the collective pitch must be held constant and increased just before touchdown. Rotor RPM is never stabilized and continues to drop throughout the maneuver.

If the altitude and airspeed are low enough at the beginning, a safe landing is possible, but the maximum (practicable) altitude is only about 10 feet.

In this article we have discussed the general principles of autorotation and purposely ignored procedures for specific aircraft. For example, we have considered only full flare autorotations. While a full flare is possible in any helicopter, it is extremely difficult in some, and many Dash Ones recommend a little forward speed at touchdown. We have also ignored the unique characteristics of some helicopters. We have said nothing about why an HH-43 will pitch down at engine failure while most other birds will yaw left. Many details such as these are simply beyond the scope of this article.

Most helicopter pilots consider autorotations simple maneuvers. Our purpose has been to explain that, though they may be simple, there are some fairly complex aerodynamic principles involved. The better you understand these principles, the better your chances of successfully completing a "simple" autorotation.

Courtesy "The MAC Flyer"
December 1971

FOD – A Constant Drain

FOD-ed engines continued to be a constant drain of critical material assets, repair costs and manpower, in addition to degrading readiness and providing a grave potential for an aircraft mishap. Currently, 23 of 26 J-79s in this station's AIMD powerplants shop are awaiting FOD repair. This high figure includes both engines turned in for FOD repair and those engines turned in to AIMD for other reasons – where FOD was also discovered during teardown.

A total of 92 jet engines (43 J-79s) received FOD at this station during calendar 1971; however, this figure does not include engines turned in for calendar inspection/vibration/other repair in which FOD was discovered during teardown.

Periodicals published concerning FOD attribute principal causes of engine FOD to poor housekeeping practices and using poor maintenance practices. Common reasons of foreign objects continue to be tools, nuts, bolts, screws, safety wire, airframe hardware, chunks of ramp material, and bird strikes. Quality assurance must constantly review maintenance practices for possible hidden hazards, poor cleanup following a job, effective tool inventories, supervised FOD walkdowns (fuel pits and grassy areas included) and an active daily FOD prevention program.

Aircraft undergoing modifications require particular attention during reassembly because of high FOD probability.

Command attention, personal motivation and education are required to reduce the number of engines receiving FOD damage. All hands must make a conscientious effort toward active and effective participation in the FOD prevention programs.

Adapted from COMFITWING msg

Bravo Zulu

DURING the night of 21 December 1971, while operating from the USS ENTERPRISE in the Indian Ocean, CDR Harry L. Klein, USN, experienced a flameout in one engine of his RA-5C. The flameout was due to material failure.

Unable to restart the failed engine, CDR Klein had few options. There was no divert field available, and a single-engine approach to a normal arrestment was ruled out by the ship because of the marginal situation which would prevail in the event of a bolter. Therefore, CDR Klein's practical choices boiled down to ejecting or making a night single-engine approach to a barricade arrestment. He chose the latter.

The precise pilot parameters required during a *normal* carrier landing in the RA-5C are significantly reduced by the loss of an engine. Add to this a *night* approach in *foul weather* without the use of APC, and the *Vigilante* pilot has no margin for error.

As CDR Klein commenced his letdown from marshall, ENTERPRISE was steaming beneath overcast skies, and light rain was falling. The letdown and approach to final were flown precisely despite the fact that, with one engine failed, only 30 degrees of flaps are used which places the stick "out of normal position" and increases approach speed. The single-engine, manual throttle approach was continued to a successful arrested landing/barricade engagement with only minor damage to the *Vigilante*.

The skillful airmanship and professional handling of this extremely difficult situation by CDR Klein avoided possible aircrew injury and loss of a valuable aircraft.

WELL DONE!

CDR Harry L. Klein, USN
Executive Officer, RVAH-5

EN GARD

"Sandpocket, this is Gobbler One on guard, request you relay to Operations my request for four box lunches at 1300Z, over."
"Gobbler One, this is Sandpocket, roger, out."
"M . . . . ."

"Sandpocket, this is Hunter-killer One, inform Ops we're in contact with a sub out here. We're not sure if it's a bad guy or a goodie so we're gonna play around with it a bit more, over.
"Roger, Hunter-killer ASW One."
"MA . . . ."

"Sandpocket, this is Hercules Seven Niner, Is Joe Bloggins around?"
"Hercules 79, this is Sandpocket, stand by one."
"Sandpocket, this is Echo Echo, test on guard."
"Echo Echo, this is Sandpocket, loud and clear on guard."
"Echo Echo, this is Confusion, how do you hear me on guard."
"MAYD . ."

"Fine, fine, well, ha
"See ya."
"Yup."
"MAYD . ."

"Confusion, this is Echo Echo, loud and clear on guard, how me, over?"
"Echo Echo, this is Confusion, loud and clear, out."
"MAY . . ."

TESTIN

*GA

DE*

rd,
quest for
out."

m

fine, well, have fun"
a."
D . . ."

"Air Force 79, this is Sandpocket, over."
"Sandpocket, 79, over."
"79, Joe Bloggins here, over."
"Joe, it's Jim, lotsaluck, we're going down to Florida for a bit of golf and I thought I'd rub it in a bit."
"Thanks for nothin'. How's Mabel and the kids?"
"Great, little Joe's a real tiger now, how's Sue?"
"MAYDA . . . "

"Sandpocket, this is Kalamazoo Ace Deuce Triple Nickel on guard, unable to contact Greenhouse, request you accept my progress, ovah."
"Kalamazoo Triple Nickel, this is Sandpocket, go ahead."
"Roger, Kalamazoo Ace Deuce Triple Nickel was by French Fries at one ninah maintaining fowah thousand item foxtrot estimating Kleinmund at fyav seven Gerhard next, ovah,"
"This is Sandpocket, roger, roger, we check that okay, have a good trip, sir, keep the ball in the centre."
"Rogah."
"MAY . . . "

"Aircraft calling on guard, this is Sandpocket, go ahead."
"BLUB O O O O O O O O O O O O O O"

*GARDE – 243.0 Mcs.

Adapted (and slightly modified) from
JOHN E. MCGEE, RCN WAVEOFF

Midairs with Birds

AN A-7B launched one spring afternoon at a southeastern naval air station. Takeoff was normal in all respects until the aircraft reached a point 1 mile past the end of the runway, and an altitude of 300 feet. At that time, the aircraft collided with a large bird (believed to be a buzzard) which struck the aircraft in the area of the radome and was then ingested into the engine.

The engine immediately began to vibrate severely. The pilot reduced power to 80 percent, notified the tower of his difficulty and commenced a left turn for a downwind entry to land.

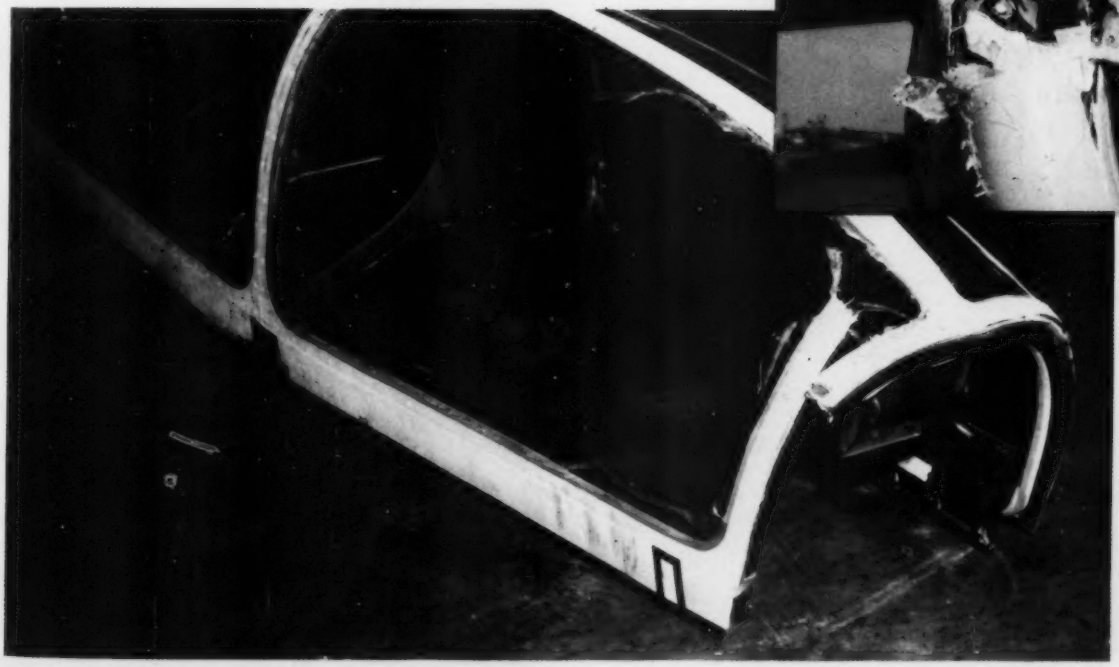
Engine performance became progressively worse as the *Corsair II* continued the approach. At less than 500 feet, with airspeed between 160 and 170 KIAS, the pilot decided the aircraft was not going to remain airborne and initiated ejection by the seat pan ejection handle. The ejection sequence was normal.

In another accident which occurred in the same general area, an A-4B was lost. In this case the pilot was taking off as leader of a section tactics hop. The takeoff signal was given and the two aircraft commenced a section takeoff.

With all indications normal, at 150 KIAS (3000-foot runway remaining), the lead began rotation and, at the same time, saw several seagulls lift from the runway ahead. One flashed by extremely close to the starboard side of the canopy. A muffled thud and "growl" from the engine occurred almost simultaneously.

The pilot immediately decided to abort while the wingman continued his takeoff safely. As the pilot lowered the nose and applied moderate braking, he saw the arresting gear go by (the gear was located about 2300 feet from the upwind end of the runway). Realizing he was approaching the end of the runway, and there was no overrun gear to stop him, the pilot

Results of bird strikes!



decided to eject.

Following ejection (which was normal) the aircraft continued off the end of the runway, across 50 feet of firm, grassy ground, over a seawall, and crashed inverted into a river bordering the airfield. The pilot also landed in the river but well beyond the aircraft. Suffering only minor injuries, he was rescued by a nearby civilian fisherman.

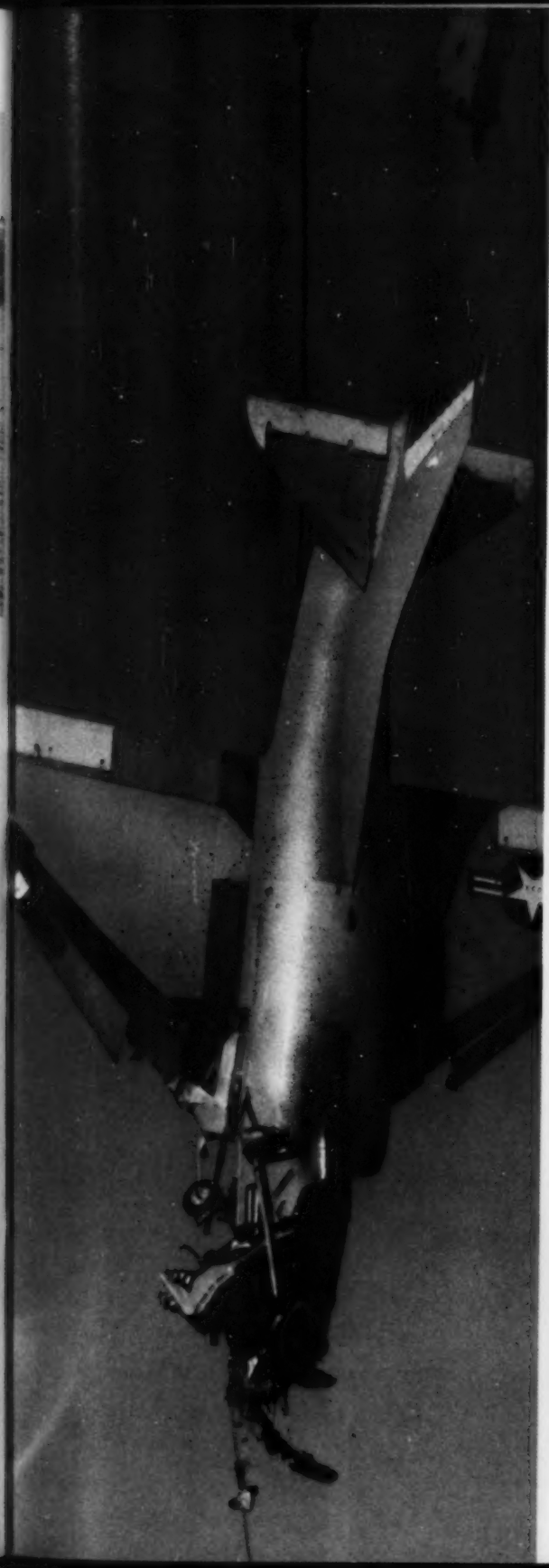
These accidents graphically illustrate the hazards of bird strikes. However, they do not show the full extent of the problem. To provide a more complete picture, NAVSAFECEN files were researched. During the period FY-69 through FY-71, there were 197 reported incidents/accidents within the continental United States involving birds and Navy aircraft.

Several questions immediately arise . . . How many personnel were injured? How much damage was done to aircraft? Where do most bird strikes occur? What season of the year do most bird strikes occur? What kinds of birds are involved? Chart 1 answers several of these questions.

Chart 1

Chart showing the approximate number and distribution of U.S. Navy aircraft bird strikes in the continental United States during the period FY-69 through FY-71.

Each single letter on the chart indicates a single bird strike. The letter also indicates the degree of damage suffered by the aircraft. D indicates destroyed; S indicates substantial damage; M indicates minor damage; L indicates limited damage and N indicates no damage. The color of the letter indicates the quarter of the year in which the bird strike occurred, i.e., red indicates first quarter; blue, second quarter; green, third quarter and black, fourth quarter. A circle around the letter(s) indicates position not fixed exactly in report.



Damage to Aircraft and Injury to Personnel

As Chart 1 shows, most aircraft escape with relatively minor damage, considering the number of bird strikes which occur. That is, most aircraft suffer only limited damage while many suffer damage so minor that it is classified as none. Nevertheless, four aircraft received strike damage during this period. In addition, no less than 58 turbojet engines had foreign object damage ranging from minor to complete engine failure. This fact alone should be sufficient to put bird strikes above the nuisance category. (Note: There were no "substantial" damage mishaps.)

If this is not sufficient to cause concern, consider personnel injuries. There were two fatalities, four major and nine minor injuries. Two of the major injuries involved personnel who *permanently lost sight* in one eye as a result of birds penetrating the canopy. Although one of these eye injuries occurred despite the fact that the pilot had his flight helmet visor down, don't discount the visor's importance *night and day*, as protection against facial injury. The fact is, there were numerous cases where birds penetrated the canopy/windscreen and struck crewmembers. In some, serious injury was averted only because of helmet visors.

Where Do Most Bird Strikes Occur?

Chart 1 shows that most bird strikes involving Navy aircraft occur near coastal areas. This does not necessarily prove that coastal areas are the most hazardous, although there is good reason to believe they

are. Rather, the fact, that most bird strikes occur here is probably due in large part to the high proportion of Navy flights which take place at coastal naval air stations.

When Do Bird Strikes Occur?

FAA Advisory Circular 5200-3 notes that migratory birds are more often on the move during spring and fall (March-April and October-November). This might lead one to believe that spring and fall are the most hazardous times of the year. Statistics, however, do not completely support this thesis, at least as far as Navy aircraft are concerned.

Chart 1 shows that all seasons of the year are well-represented. In other words, as far as naval aviation is concerned, there does not seem to be any *good* season. This may be due, in part, to the fact that, in addition to the hazards posed by the spring and fall migrations, there is an additional hazard posed during winter in the

Above: Warm runways are a favorite resting place for birds, including seagulls. Insets (above and below) show impact damage to aircraft.

areas where the birds winter over. Also to be considered is the fact that an undetermined but substantial number of bird strikes involve non-migratory birds.

Migratory Birds

In view of the vast number of birds involved in seasonal migration and wintering-over, it may be worthwhile to review what FAA Advisory Circular 5200-3 has to say on the subject.

Migratory birds, particularly waterfowl, are a serious hazard to aircraft due to their size and weight. In recognition of this potential hazard, FAA air traffic control and flight service station facilities issue advisory information on bird activities when they are reported, or when they have knowledge of such activities. Information given to pilots includes the position and, if known, the species or size of birds, their course, and altitude.

The birds considered of greatest potential hazard to aircraft, because of large size and numbers, or habit of flying in dense flocks, are whistling swans, Canada geese, blue geese, white-fronted geese, mallards, pintails, gulls, vultures, starlings and blackbirds. These species are considered particularly dangerous during spring and fall migrations, and when they are concentrated in wintering-over areas.

Swans make nonstop flights of several hundred miles (Chesapeake Bay to Lake Erie) at altitudes up to 6000 feet. At some airports, there are large flocks of sandpipers, horned larks, blackbirds, tree swallows, longspurs, white pelicans, sandhill cranes, or other species which prove to be problems during certain seasons.

The four major bird flyway routes (Chart 2) within the continental United States are:

(1) *Atlantic Flyway* – Chesapeake Bay, Back Bay area in Virginia, and the Currituck Sound, Lake

FLYWAYS OF MIGRATORY BIRDS

Chart 2

Mattamuskeet area in North Carolina.

(2) *Mississippi Flyway* – The Mississippi Valley and the South Louisana marshes along the Gulf of Mexico.

(3) *Central Flyway* – Along the Missouri River and the Gulf Coast of Texas.

(4) *Pacific Flyway* – In the general area of Lake Tahoe and the Sacramento Valley area in California.

Minimizing the Hazard

As long as birds and aircraft continue to operate in the same airspace, there seems to be little chance that bird hazards can be eliminated altogether. However, there are a number of steps which can be taken to minimize the hazard. Airport officials, for example, can do much in conjunction with local municipal authorities to discourage the presence of birds around airports and other low altitude operating areas. According to FAA, attention should be given to filling, levelling, and clearing airports and adjacent land which create bird refuges. These areas increase bird hazards by providing feeding, bathing, loafing and resting places.

Birds are attracted to garbage dumps, food and fish processing wastes, feed pens and piggeries, ponds, sloughs, swamps, man-made lakes, and reflecting ponds. In addition, individual pilots can take preventive steps which include:

(1) Learn all you can about the bird life in the area where you operate. Then avoid areas and altitudes where birds are known to congregate.

(2) When you encounter birds in flight, remember that they will try to avoid aircraft, and that migratory birds will usually do this by diving. Therefore, avoid flying directly under birds if there is a reasonable alternative. You can aid birds in avoiding aircraft by reducing airspeeds at low altitude, if practicable. Showing landing lights at night will also help.

The bird strike damage is evident in this head-on view of a T-34B wing.

Though minor in damage, the radome of an E-1B was not spared when contact was made with one of our feathered friends.

(3) Should you collide with a bird(s) and there is any probability that a bird has been ingested by an engine, land at the nearest suitable airport. Statistics show that there is a good chance of foreign object damage when birds are ingested.

(4) Operate with your helmet visor down at all *practicable* times (use clear visor for night). This can be an important factor in preventing serious injury in case of a midair with a bird.

(5) Recognize that takeoff and landings are the most critical times relative to bird strike hazards. Keep a good lookout and be certain to report birds, on and about the airport, to the tower. Also, when applicable, report flocks of birds to the controlling FAA agency so that others may be warned.

Finally, remember that although we must continue to share airspace with the *real birds*, we want to do it as safely as possible. ◄

Minute in quantity, but the residue found on thermocouples caused serious problems.

CHECK YOUR 12

By LT D. H. Ryder, USN

THE WRECKAGE stopped smoking 11 days ago. The pilot is back, and the Aircraft Mishap Board has 3 working days to put the finishing touches to its report.

It's straightforward.

A case of material failure. Canopy came off in flight; hit the vertical stabilizer partially jamming the controls. Pilot ejected when the nose pitched up uncontrollably as he slowed to gear speed.

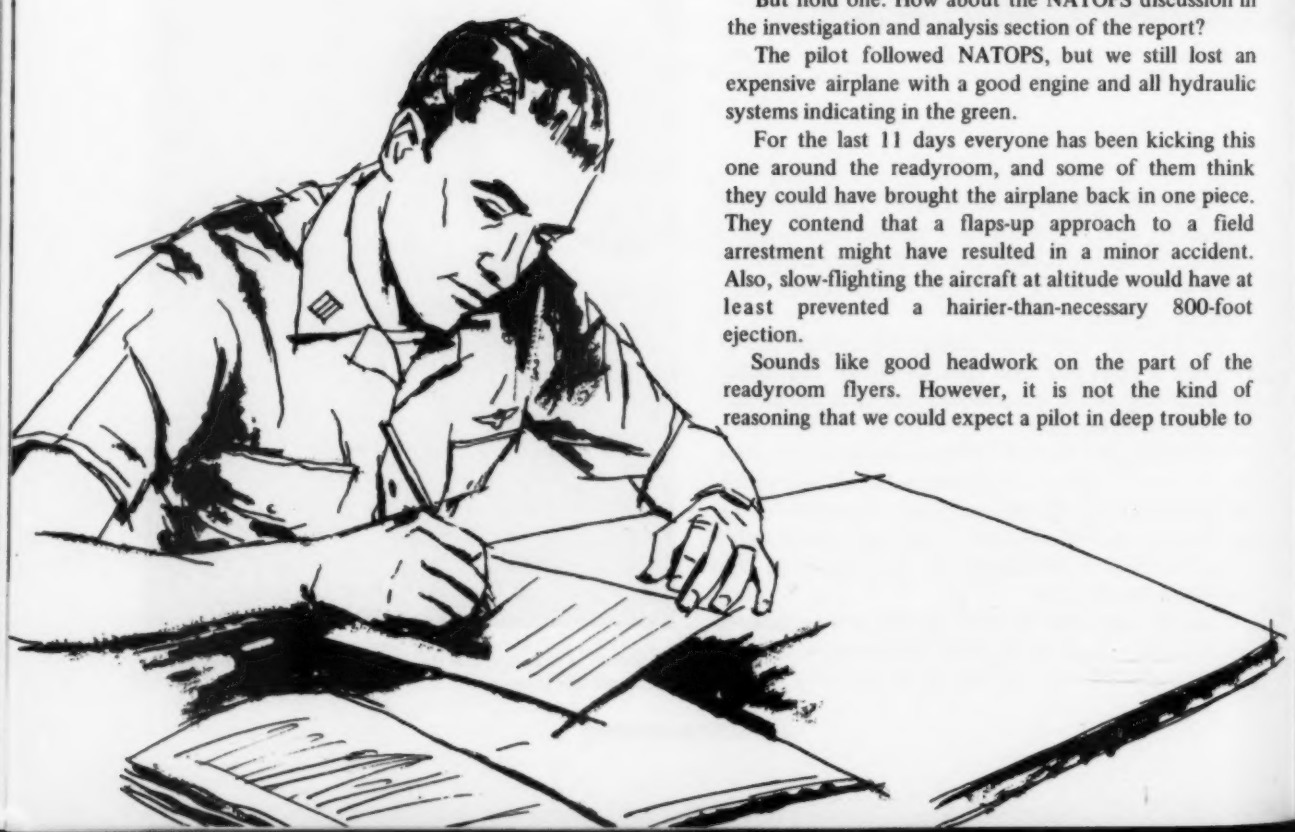
Alfa damage, $30-40,000 for six pine trees, and things seem pretty much wrapped up. Once the engineers find a way to lash the greenhouse together a little better we shouldn't have any more problems.

But hold one. How about the NATOPS discussion in the investigation and analysis section of the report?

The pilot followed NATOPS, but we still lost an expensive airplane with a good engine and all hydraulic systems indicating in the green.

For the last 11 days everyone has been kicking this one around the readyroom, and some of them think they could have brought the airplane back in one piece. They contend that a flaps-up approach to a field arrestment might have resulted in a minor accident. Also, slow-flighting the aircraft at altitude would have at least prevented a hairier-than-necessary 800-foot ejection.

Sounds like good headwork on the part of the readyroom flyers. However, it is not the kind of reasoning that we could expect a pilot in deep trouble to



sort out instantly.

Even in this ficticious instance it's easy to imagine that sudden blast of cold air and the sickening feeling that the nose was never going to stop its relentless climb. The procedures had been followed. The time for headwork had passed, and the time to step outside had arrived.

NATOPS let this pilot down.

It was incomplete.

His squadron mates know it, and they have the answer.

Professional blasphemy?

I doubt it.

There is no great NATOPS officer in the sky, no one to keep track of all the possibilities, no computer programmed to tell us what microscopic glitch interacting with some stray electron can turn several million dollars into a scorched hole.

In this case, the squadron has the answer, but not many other people have realized the question. The way to prevent similar occurrences is to put them together for everyone's use.

The format is the *NATOPS change recommendation.* In the case of accidents, it is an implied requirement. It is a UR with a built-in solution.

The process is simple. In the front of every NATOPS manual is an invitation for all users to edit the book and a form to do it on.

The change should be inserted in the first large block in precisely the words you want to appear in the manual.

The process for writing the change will be simple if all the answers are at hand. However, it is likely that some technical advice may be necessary.

Tech reps, NARF, NAESU, and your own mechs and twidgets are standing by to assist you.

Once the procedure is written, you have to tackle the justification. This is frequently the most difficult section to write. A simple statement saying your new procedure is necessary, or that it is better, or more complete, or covers some item previously not considered, is just the beginning.

Few recommendations are immediately stamped URGENT and put on the wire. The merit of your change must be proven in the justification section, for if it was not included in the manual already, the problem and solution can not have been obvious to everyone.

When your justification is ready for a smooth, think of all the arguments against your change. If they are significant, state them and attempt to show that your change satisfactorily covers the contingencies. Answer the questions before they are asked.

Most change recommendations end up at the NATOPS conference. The purpose of the conference is to discuss, modify, select, or reject the changes submitted by the users. The conference creates very few of its own changes, and these are generally based on submitted items.

If the conference receives recommendations that are clear and correct with justifications that really justify publication of the change, the members can move rapidly for inclusion.

The converse is obviously true. Recommendations that say "Hey, the schematic on 1-14 is wrong," or justifications that say, "The airplane doesn't work that way," don't accomplish much.

The people who run the conference are naval aviators whose basic qualification is a little more time in type than the average driver. They are assisted by factory representatives, Safety Center, NATC, and other interested commands.

The guts and brains of the operations are the model managers. They or their representatives are finally responsible for the content of the manual, but the fleet must give them solid recommendations to work with.

Unfortunately, many recommendations are based on the hindsight of an AAR, a sort of "check your six, and let's not have this happen again."

Equally important recommendations with far less expensive justifications than broken airplanes are more desirable and usually possible.

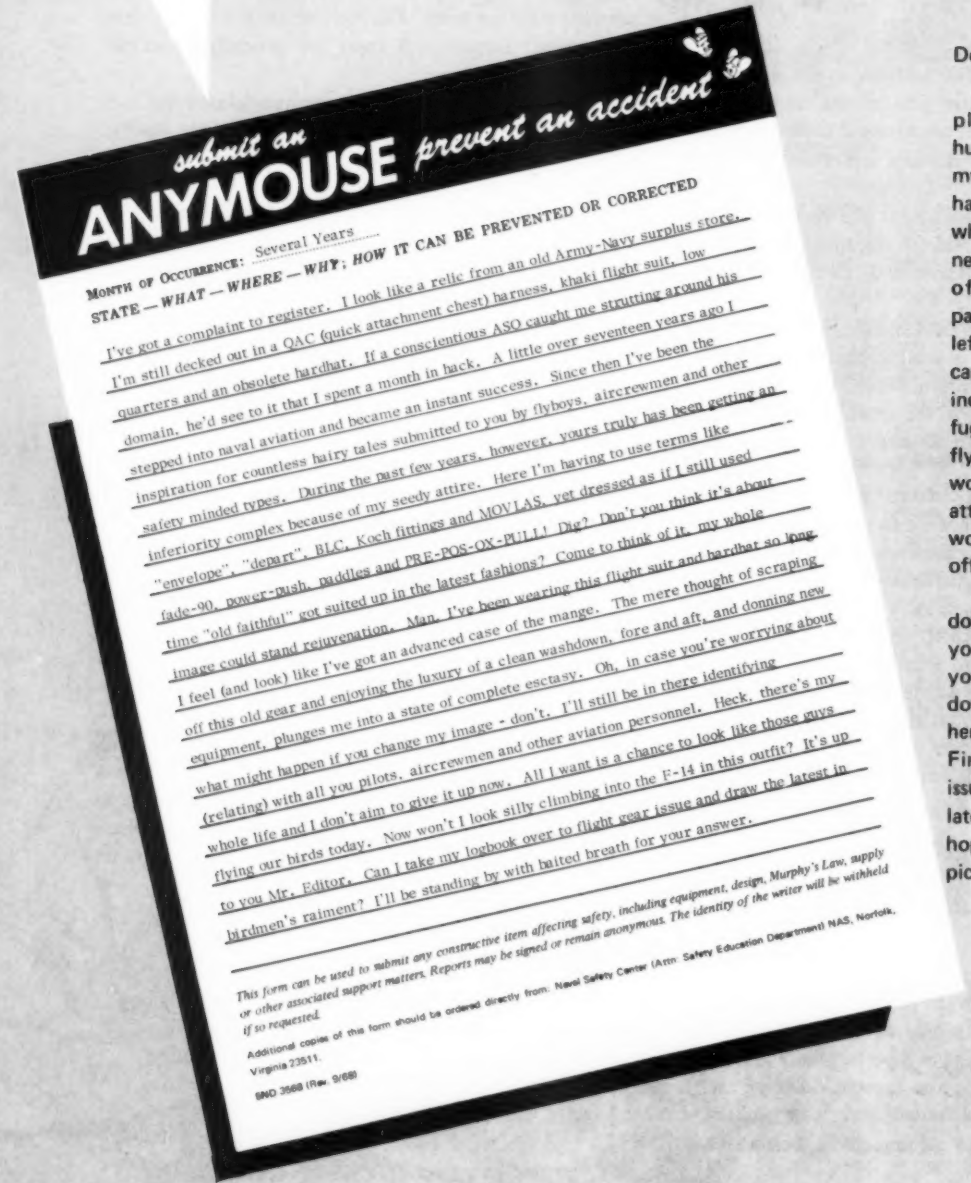
If you encounter an item in the manual that is wrong, unclear, confusing, or just isn't covered, you have a problem in your sights. Get on it, or task someone to propose a rectification. Don't let a semantic problem, that is squarely at your 12, barrel roll and bite you on your aerodynamic tail. ◄

The Value of a Waveoff/Go-Around

THE GOAL of every pilot is a consistently good approach to landing. The true professional recognizes that a poor approach may develop and will take a prudent waveoff rather than continue the landing. Too often, misguided pride or a performance goal overrides objective judgment, and results in an accident during the attempt to salvage an approach. During carrier operations, LSO judgment on when to wave off due to a poor approach or a fouled deck is an additional critical factor. Commanding officers should ensure that prudent go-arounds are commended, not censured.

COMNAVAIRLANT *Weekly Safety Bulletin*

We Get Letters



submit an
ANYMOUSE prevent an accident

MONTH OF OCCURRENCE: Several Years

STATE — WHAT — WHERE — WHY; HOW IT CAN BE PREVENTED OR CORRECTED

I've got a complaint to register. I look like a relic from an old Army-Navy surplus store. I'm still decked out in a QAC (quick attachment chest) harness, khaki flight suit, low quarters and an obsolete hardhat. If a conscientious ASO caught me strutting around his domain, he'd see to it that I spent a month in hack. A little over seventeen years ago I stepped into naval aviation and became an instant success. Since then I've been the inspiration for countless hairy tales submitted to you by flyboys, aircrewmen and other safety minded types. During the past few years, however, yours truly has been getting an inferiority complex because of my seedy attire. Here I'm having to use terms like "envelope", "depart", BLC, Koch fittings and MOVLAS, yet dressed as if I still used fade-90, power-push, paddles and PRE-POS-OX-PULL! Dig? Don't you think it's about time "old faithful" got suited up in the latest fashions? Come to think of it, my whole image could stand rejuvenation. Man, I've been wearing this flight suit and hardhat so long I feel (and look) like I've got an advanced case of the mange. The mere thought of scraping off this old gear and enjoying the luxury of a clean washdown, fore and aft, and donning new equipment, plunges me into a state of complete ecstasy. Oh, in case you're worrying about what might happen if you change my image - don't. I'll still be in there identifying (relating) with all you pilots, aircrewmen and other aviation personnel. Heck, there's my whole life and I don't aim to give it up now. All I want is a chance to look like those guys flying our birds today. Now won't I look silly climbing into the F-14 in this outfit? It's up to you Mr. Editor. Can I take my logbook over to flight gear issue and draw the latest in birdmen's raiment? I'll be standing by with baited breath for your answer.

This form can be used to submit any constructive item affecting safety, including equipment, design, Murphy's Law, supply or other associated support matters. Reports may be signed or remain anonymous. The identity of the writer will be withheld if so requested.

Additional copies of this form should be ordered directly from: Naval Safety Center (Attn: Safety Education Department) NAS, Norfolk, Virginia 23511.

SND 3588 (Rev. 9/68)

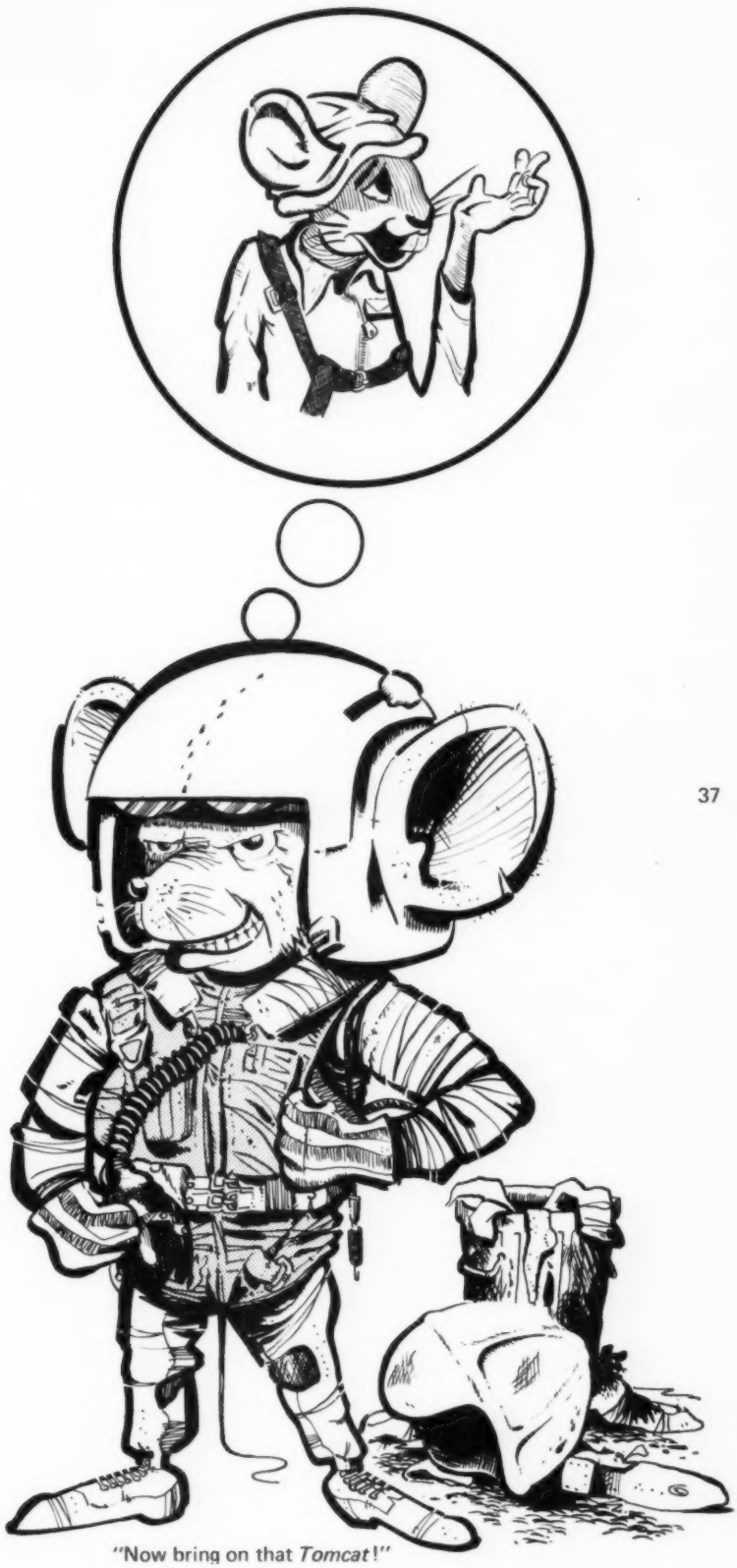
Dear Anymouse,

Upon receipt of your pleading "Anymouse," I hurriedly rummaged through my desk for a likeness of our hairy-letters editor. It took a while, but there you were, nestled at the bottom of a pile of dusty, cobweb-covered papers located in the lower left-hand drawer. Suddenly, I can understand your righteous indignation. You look like a fugitive from a post WW I flying circus. Your use of the word *seedy* in describing your attire is conservative; *ratty* would be more appropos (no offense intended).

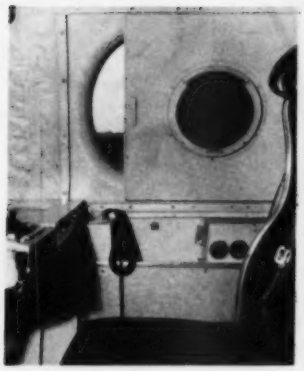
Yes, something must be done, and quickly, to improve your appearance and bring you up-to-date (and to tone down some of the red faces here at the Safety Center). First, scurry over to flight gear issue and draw a bag of the latest flight clothing. Next, hop over to the paraloft and pick up what you need in the

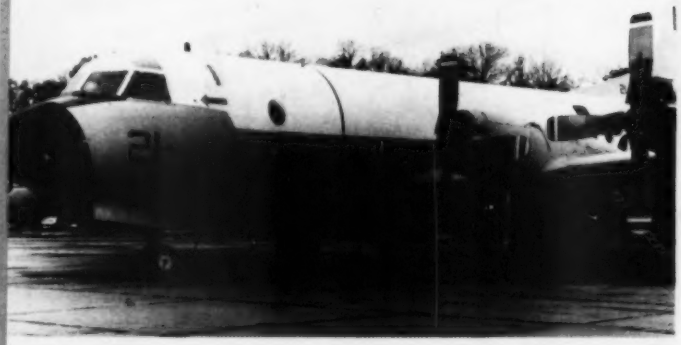
way of aviators equipment. Following that, get yourself fumigated, take a well-earned bath, and schedule yourself for a flight physical and a low-pressure run for an update of your UP-chit. When you're finished there, find a tonsorial salon that can change your image to the year 1972. After all of the above, stop by the photo lab, and have a current photo taken. Tell the photo lab to rush a print to the Safety Center so we may use it in the next APPROACH.

Let me apologize on behalf of the Naval Safety Center, for not taking the above action sooner. You've certainly proved your worth during the past 17 years, as everyone in the naval aviation community has benefited from your hairy-tales. With your new image, the years to come should prove even more fruitful. Keep up the good work. – Ed.



"Now bring on that *Tomcat*!"





Don't Look at the Sun Through Polarizing Windows

AIRCREWMEN are warned not to look directly at the sun through the "polarized" blackout filter type windows used in P-3C aircraft at the TACCO, NAVCOMM and Sensor No. 3 stations. Lockheed-California letter (LC/025187 dtd 28 Sep 71) warns that it may be possible for the human eye to sustain significant and irreversible central retinal injury due to thermal burns.

In view of these possible severe eye injuries, a change to warn crewmembers has been recommended to the P-3C NATOPS Flight Manual and the P-3C NATOPS Crew Operator's Manual. (COMNAVAIRLANT message 092325 of Nov 71 refers.)

notes from your flight surgeon

Unfasten O_2 Mask

DURING parachute descent, a pilot pulled his helmet and mask completely off, saw that he had a full chute, and replaced them.

The oxygen mask should not have been replaced, the investigating flight surgeon points out. If the pilot had lost consciousness during descent, or on landing, when the oxygen in the seat pan was exhausted, he could have suffocated. The aneroid will not deploy the parachute until such altitude as the pilot can breathe ambient air. Therefore, once the parachute has opened, the oxygen mask should be unfastened.

Pinch Point

"AS the rescue swimmer and I were being brought up on the hoist," a rescued pilot reported, "I just naturally grabbed the cable. This caused my right index finger to be severely pinched as my hand reached the hoist pulley."

Keep your hands on the rescue seat or sling when being hoisted into a helicopter. It would be a shame to come through an ejection unscathed and then injure your hands in the helo hoist.

Recommendation

"I searched for the Mk-13 Mod 0 flares in my inflated Mk-3C life preserver and found one of them under the forward part. I was unfamiliar with their exact stowage position, and I recommend that everyone be required to use an inflated Mk-3C and raft during annual water survival training."

Pilot after ejection at sea

Why?

SOMETIMES a fatality occurs, and you can only speculate "why." The following mishap involving an airman aboard a carrier is just such a case.

While working with a tractor fueling crew during a morning launch, the AA wore his flight deck survival vest and sound attenuating helmet. After fueling was completed, the crew proceeded to a division crew shelter on the 03 level. The next time anyone recalled seeing the AA, he was on the flight deck between the No. 1 and No. 2 elevators and carrying his helmet and lifevest.

Presumably intending to leave the flight deck via the catwalk between the elevators, he proceeded aft of an RA-5C, then headed toward a starboard catwalk ladder 10 feet from the tailpipe of an A-7E at idle power. Investigators believe he struck his ankle or shin on the catwalk railing and was blown over the side. He was next seen in the water – conscious and apparently trying to stay afloat. He had lost both his helmet and lifevest.

Two flares thrown off the bridge landed within 75 to 100 yards of him. In less than a minute the SAR helo was over the spot, but he was gone. Although the helo crew recovered the helmet and lifevest, an intensive search by the helo and two destroyers was unsuccessful.

The airman's record showed that he was a Class C swimmer. Shipmates stated that he considered himself a non-swimmer and that he was afraid of being blown from the flight deck and drowning. He had attended two lectures on flight deck safety within the month.

"And still he walked about the flight deck carrying the very gear which, if worn properly, could have saved his life," the investigating flight surgeon comments.

"In removing his safety equipment," the flight surgeon continues, "he demonstrated a total disregard for basic flight deck safety rules. Whether this was done because of complacency, inattention, a feeling of omnipotence, a gesture of defiance or for some other external or internal factor cannot be determined. There can be no doubt that if he had been wearing his flotation gear, he would have been rescued."

Velcro and Strobe

"THE ONLY difficulty I had was making sure the strobe light could be seen because the inflated LPA-1 lifevest tended to block it out. I had to hold the light in my hand above the lifevest collar."

Pilot after overwater ejection and rescue

Air Crew Systems Bulletin 150 (Distress marker lights, SDU-5/E and Matrix 761-A; modification for better utilization of) solves this problem.

The bulletin authorizes local modification of the light and helmet with velcro tape so that the survivor can zap his light to his helmet and free his hands. A 2-inch square patch of velcro pile tape goes on the helmet and a matching patch of hook tape on the light.

The bulletin also states that this same modification can be used on the dual visor **BPH** *and* **SPH** *helmets without interfering with the visor lock mechanism.* ◄

GROW OLD ALONG WITH ME

By Robert W. Duncan
Professor of English
University of Southern Illinois

In 1945 the author carqualled an F-6F *Hellcat* aboard the USS SABLE (IX-81), a *side wheeler* with a deck length of less than 500 feet. Serving from December 1941 to October 1945 as a naval aviator and again, from 1949 to 1957 as a naval reserve pilot, he gained extensive experience as a fighter pilot in the F-4F, F-6F and F-4U.

RECENTLY I took what I am sure was my last flight as pilot of a military aircraft. I was a member of an outfit which was eliminated in the defense expenditure cutback, and I have ranked and aged myself out of active reserve duty. I would be less than human if I did not, at this time, look back on my years of flying and try to evaluate the factors which operated to keep me alive, as well as those mistakes which might have killed me.

I felt a resurgence of the impulse to buttonhole young men and women just beginning, whether in private or military flying, and say the magic words which will keep their bones intact and send them home each evening, a joy to spouse and children.

I can say what I have to say without pride or arrogance, because I was a mediocre pilot. I learned slowly; I was not by any stretch of the imagination a "natural." My awareness of my limitations, I am sure, is one important factor to which I owe my life.

I did not have the skill to toy with chance and stretch my craftsmanship beyond its capabilities. I would not slow-roll at less than 5000 feet, because I scooped out at least half the time; nor would I practice spins unless I had so much altitude that the ground seemed as remote as the moon.

There are two kinds of pilots who get hurt: clever ones and poor ones. The clever ones gradually acquire a confidence which may mislead them, and tempt them to cross the safety margin once too often; the poor ones are merely incapable. But there is one common attribute which both types possess: they lack imagination. Their thinking is narrow; they fail to consider the possible consequences of a breach of flight discipline, a disregard for NATOPS, or an overextension of their abilities.

They assume that *all* conditions at *all* times will be normal. They assume that the ground is flat without obstructions, that the old altimeter setting is good enough, that there is no other plane in the air, that the weather will hold, that the obsolete chart is reasonably accurate, that the fuel tank was topped, that the field is open, that the mags will clear in the air, and that the runway is long enough despite the temperature.

Change Constant

These are foolhardy assumptions, resulting from laziness and wishful thinking. If there is one thing we can be sure of in this journey through the cosmos on this thin-skinned pea of an earth, it is that change is constant; nothing is ever the same.

It is apparent to me that the human race is invincible. You need only consider the fact that a man who knows he has only one life to live will offer it to eternity because he is too lazy, or too unimaginative, to take an extra minute to ask a mech how much oil was put in. This brand of courage exceeds that of the tiger.

I distilled a single rule from the potpourri of experience, a rule which contains just about all there is to flight safety. It is, however, a mere phrase, unless we extend it through every flight activity. It is simply:

Never Take Anything For Granted.

There are plenty of things which we are forced to take for granted without adding to the list. We must accept the evidence of our eyes and nose that the liquid in the tank is aviation gas or JP, that the length of the runway is 8000 feet if Enroute-Supplement says it is, and that the fuel control will compensate for changes in altitude. We lean heavily on properly trained authorities for vital information, and if they fail us we cannot help it.

But there are those factors which can be checked personally, which should *never* be taken for granted. I learned one lesson fairly early, and the nearness with which I came to killing, not only myself, but another pilot, had an extremely sobering effect.

I was lined up on the runway's centerline with a student under the hood in the rear cockpit, preparing for an instrument takeoff. Another plane was lined up ahead for the same purpose. My student was on the brakes, ready for full throttle when I gave the order. While I could not see over the nose of my plane, I did observe the wings of the first plane recede and disappear as it started down the runway. After a decent interval I told the student to roll, and I stayed on interphone to advise and correct him. He did so, and a few seconds later my guardian angel stepped in.

"Now look, buttonhead," he said to me, "the first plane started rolling, and you figure that he is airborne at the end of the runway by now. But you don't see it. You're just taking it for granted."

I took control, hit the brakes, and throttled back. My aircraft stopped 20 feet short of the No. 1 plane, which had aborted, probably because the student was veering off heading. I would unquestionably have chewed through at least one cockpit if I had continued.

Experience of Others

I owe to a certain vice of mine a good bit of the credit for the fact that my wife was cheated out of $10,000 of NSLI insurance: I am an experience thief. I steal the experience of others.

Your own experience is the worst possible teacher despite the famous dictum. It is much too expensive. I enjoy the nasty habit of appropriating that of other pilots.

Every time I read or heard of an accident I would ask myself: "Do I fly in such a way that it could have happened to me?" If the answer was yes, I did my best to correct my habits. Like a parasite, I stayed alive on the flesh and blood of others, and I admit it without shame.

I love the taste of hamburgers with catsup and onions, and I love my wife's embrace in front of the fireplace on a fall evening. My imagination is a vivid one, and when I fail to see the other plane in the traffic pattern when tower informs me it is there, I panic.

No more hamburgers? No more kisses? The cold sweat breaks out, the head is swiveling like a Grimes light. No more baseball with my boys? The heart beats faster. The blood pressure rises. No more cans of beer on a hot afternoon? The breath comes short and hot.

Where in hell is that other plane?

I bank right and left to find it. I drop first the right wing, then the left.

Tower: "Nine zero four, are you having difficulty?"

Oh, no. How can the thought of a midair collision at 1000 feet suggest difficulty?

I make my voice calm. Nobody must know that I am afraid of a midair collision. After all, am I not a pilot?

"Tower from 904. Don't have the other aircraft. What's his posit?"

Tower: "He's on short final. You're No. 1."

"And how did it go today?" Cindy asks as I pick a cold beer out of the six-pak.

"Very nice," I answer. "Do you think it's chilly enough to light the fire?"

Casey the Ace

I knew two pilots whose tragic exits I was able to predict. One was a clever man, with an enviable skill and a superb practical and theoretical knowledge of aerodynamics. The other was a wise guy.

I loved Casey, the first one, like a brother. He taught me much about flying, and he was, for me, St. Exupery and Jimmy Doolittle rolled into one. But he couldn't subtract. He didn't know when his units of safety were reduced to a dangerous minimum. His skill was his murderer.

He could roll at 200 feet and never scoop out. His aircraft was as his own body. This is a fine thing, but there are possibilities over which your skill has no control. Engine failure is one of these, and engine failure when inverted at 200 feet is a troublesome event. A parachute is useless, and your choice of pasture is severely limited, even if you complete your roll. Casey did not complete his. He scattered gas, guts, and gaskets over 500 feet of ripening corn.

I was such a mediocre pilot that I never had the courage to attempt such intrepid maneuvers. I mourned the death of Casey, but my grief didn't help him. He has been long gone, and I am here tonight, as I write, watching the scarlet leaves of the maple drift by my window in the moonlight. And yet his craftsmanship far exceeded mine.

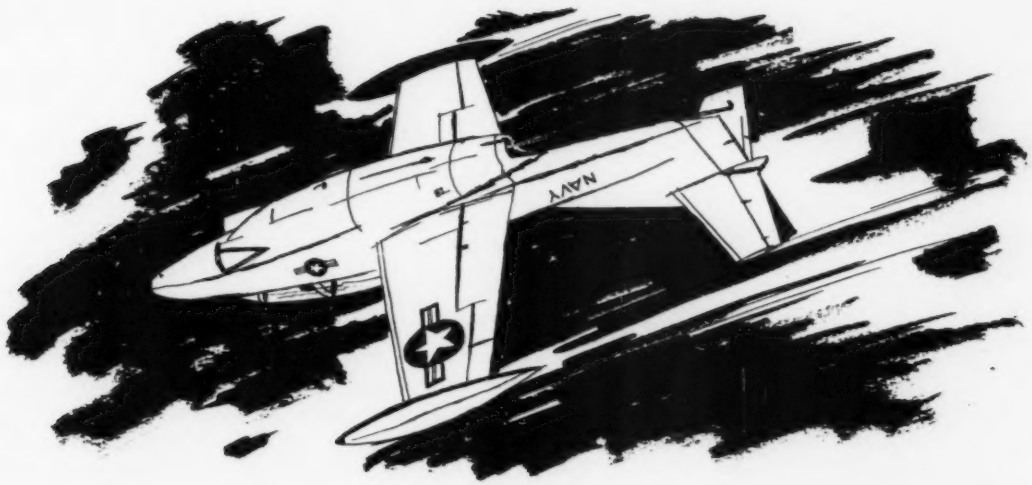
Marvell said it 300 years ago:

"The grave's a fine and private
place,
But none, I think, do there
embrace."

But I love to stunt. You should see my triple sequence: the split-S, loop, and Immelman, coming right out on the original heading. I start it at 10,000 feet. I'm very proud of it.

The other pilot I shall call Grant. He was a likeable youth, but he lacked humility. He wore his cap on the side of his head, and made wrapped-up turns to a landing. He would argue aerodynamics with pilots who had more hours of *night flying* than he had *altogether*. Can you imagine yourself advising Saint Ex on the best route to Dakar? Grant could have done it.

One day I said to him, after a particularly disheartening discussion (I think he was insisting that a



plane in the air would weathercock): "Grant, it matters not to me whether I win the argument, but if you fly like you talk, you're gonna kill yourself."

He snorted, retilted his cap to a more rakish angle, and stalked off whistling, "Off we go, ta-ta-ta-tum-tum-tum-tum."

I had no car in those days, so Grant picked me up every morning to drive to work. One Monday morning, 2 weeks after my melancholy prediction, he failed to show, and I had to hitchhike. No bus.

The CO was on the phone when I loped in, an hour late. I was nervous and furious; we were flying a very tight schedule. I started blabbing when it was apparent that the CO was waiting for somebody at the other end.

"That damn Grant didn't pick me up this morning! It ain't my fault!" I pounded on the desk.

The CO started talking on the phone, and being versatile like Caesar, wrote a note for me on the pad.

Grant was killed yesterday.

I had the psychic feeling of inevitability you sometimes get in a poker game when the card you draw is exactly what you expected. Of course, I said to myself. What else could it be?

He had his brother, a visiting cadet, in the rear seat when he pulled the wings off the trainer over Biscayne Bay. The only two boys in the family. What would his mother think, I wondered, and what could his father say?

I said that Casey didn't know how to subtract. I referred to my formula for safety. According to my ingenious reckoning, safe flight is maintained only when you stay above a certain number of what I call safety units.

When you have trouble in an airplane, there are at best, a fairly large number of lifesaving alternatives. As far as I am concerned, there are more of them in the air than on the highway, where an oncoming car on your side of the road, passing on a curve, may reduce your alternatives to near zero. These units are your treasure, money in the bank, the buffers against chance, fate, bad weather, or even your own fallible judgment . . .

When the sea-stories drift around to telling hairy tales of flight, don't feel put down just because your logbook has a clean "Accident and Flight Rule Violation Record" page. Why, with a little imagination and the right superlatives, you can make a T-28 prop governor failure sound comparable to a double generator failure while IFR in a *Phantom*. Or even better, a normal night bolter can sound as hairy as a night barricade trap in an RA-5C.

Best of all, feel within yourself the satisfaction of completing difficult and, quite often, dangerous flight missions in a cool, professional – and *safe* manner.

Now I am a private pilot only. I look forward to dancing the skies on "laughter-silvered wings," to winging to my destination in a safe, straight line, far above the twisting hazards of the increasingly expensive highways. There are no toll roads up there in the blue, no billboards, no speedtraps, no traffic lights. There is only the challenge to my imagination and to my common sense.

I must finish now. The ashes are glowing in the fireplace. Cindy has the coffee on, and I have marshmallows to toast.

Courtesy of AIRFACTS magazine

Do You Drive at

Supervisual Speed?

EVERYDAY on highways throughout the United States, motor vehicles are being driven so fast that the driver's ability to see and react correctly cannot keep pace with the demands made upon him. That fundamental fact has a direct connection with the 55,000 to 58,000 fatal auto accidents and the 2 million-plus non-fatal injuries that occur each year.

The situation may be described in this way: for various reasons we see less quickly, surely, and comprehensively, the faster we travel. But the need for seeing more quickly, surely and comprehensively, actually *increases,* because the driver has less time to act if a crisis occurs at 70 miles per hour than at 40. Thus, the more visual power we require for safety, the less we have.

At 50 mph, it has been calculated that a driver sees 14 percent less than at 45 mph. At 60 miles, his effective vision is narrowed down to the mere width of the road. Why? Because it takes time for the brain to see, as distinguished from the eye.

However, the images recorded at high speeds are blurred, or "unresolved." More than that, the brain needs time to identify and interpret what the eye sees. If the image is indistinct, still more time is required to make out what and where it is. Objects lying on each side of the road simply flit by without being "seen" at all because the brain cannot identify them.

We can give this rate of travel a name. Let's call it "supervisual speed," and let's define exactly what we mean by it. In coasting along at 15 or 20 mph, a driver's vision may be regarded as more than adequate. It wouldn't be any better if he drove slower, or any worse if he went considerably faster. At such speeds he enjoys a surplus of visual power. He is safe, as far as vision can make him safe.

However, as the speed indicator needle creeps higher, a critical point is finally reached. At that point, the driver's vision is no longer good enough to extricate him from a critical situation with which he would have been able to deal at a slower speed. Surplus visual ability has now disappeared, and a growing deficit takes its place as the needle swings to the higher figures. The driver is now in the area of supervisual speeds.

On the highways today, it is routine for many of our trucks to travel in excess of 80 mph while more and more automobiles are traveling in excess of 100 mph. At 100 mph, vehicles are traveling at a rate of 147 feet per second. At these high speeds about all a driver can do is aim his vehicle. Once the driver loses control or another vehicle pulls into his lane of travel, the end result is usually death to the occupants and total destruction of the vehicles involved.

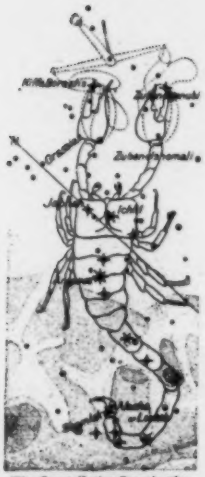
The unfortunate fact is that many innocent victims must pay with their lives each year so that these speed demons can have the satisfaction of driving at excessive speeds on our public highways.

National Safety Council Safety *Newsletter*

LETTERS

Anger is just one letter short of danger.

Will Rogers



The Constellation Scorpio (the Scorpion), with Libra.

Oxygen Mask

NAS Anyplace – As the ASO of a fighter squadron I have been unable to get 50 percent of my squadron to wear oxygen masks. In my opinion, the present mask is almost intolerable for any flight over 1 hour. I have not had much command backing as my CO uses a boom mike along with the rest of the pilots.

During the last 2 months, we have had two cases of hypoxia. Unless we (the Navy) get an acceptable mask, we will lose more aircraft for unexplained reasons. As safety officer, I have obtained some Air Force masks and adapted them to the F-4. This is only a temporary measure, but it works.

Anymouse

• With regards to the Air Force mask (USAF MBU/5), it is not authorized for Navy use. General NATOPS states that the latest available flight safety and survival equipment, as authorized by Aviation Crew Systems Manual, Volume 7 (Aircrew Personal Protective Equipment), NAVAIR 13-1-6.7, shall be used for flight in naval aircraft. Further, the manual states that the A-13A is the only authorized pressure demand oxygen mask. There are, however, a couple of new masks being fleet evaluated at this time and a total of 2000 will be issued for evaluation. As information becomes available on this development, it will be passed to you, the operator.

CNO message 142100Z Jan 72 effected a change to General NATOPS relative to the use of oxygen masks. In tactical jet aircraft the change directs usage "from takeoff to landing."

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Is NATOPS Enough?

USS INCHON – During a recent early morning assault operation, a CH-53D landed aboard this LPH for hot refueling. The flight deck crew scrambled through gently falling rain to properly position the wheel chocks, while a fuels man entered the helicopter to check the amount of fuel required.

Several seconds later, as both pilots were looking at the fuels man, the nose of the chopper began to move toward the port catwalk. The nosewheel, properly locked, slid smoothly and rapidly across the wet deck – giving little indication to the pilots that anything was amiss. An urgent call from the tower brought immediate reaction, and the helicopter was stopped short of the catwalk.

This aircraft save strengthens the argument for keeping UHF radios energized during hot refueling. (The CH-53D NATOPS Manual indicates that use of this equipment is optional.) This near-accident brings up the debatable subject of chocks only, versus chocks *and* chains, during hot refueling. The intent of my letter is not to settle the debate but to point out once again the necessity for alertness by all personnel concerned during hot refueling.

The flight deck crew, refueling crew, and the air boss are mighty important people during this evolution; but by far the *most important* are the pilots in the cockpit. Chocks only *can* be safe . . . UHF only *can* be safe . . . but *only* if aircrews stay alert.

LCDR R. E. Nahlovsky
ASO

• That's Charlie! Any time those blades are whirling, someone in the cockpit should be minding the store. Cockpit coordination would negate a repetition of this incident. The HAC can easily tell the copilot to watch what's going on while he (pilot) looks over his shoulder to converse with the fuels man. Also, the bird should be chained down. Just don't forget the unhitch checklist before liftoff.

Ghostrider In The Sky

NAS Pensacola – On the back cover of the October 1971 issue of APPROACH is a unique safety poster. Safety posters are an excellent means of expressing safety ideas and getting the message across. However, safety principles should be stressed in any safety photo. My point is, of course, where is this F-4 pilot's hardhat?

LTJG Ernest C. Lester
Assistant ASO

See next letter

FPO, San Francisco – Re: APPROACH/ October 1971, rear cover entitled: "Reusable Container Do Not Destroy."

While reading your publication it came to my attention that the pilot and RIO appear to be flying a high performance type aircraft without the protection of a safety helmet.

I realize that the two individuals would undoubtedly have their best features hindered by the use of said helmet, but it seems an unsafe practice to have their helmets anywhere else but

on their heads.

Good luck to them in case of crash or bail-out.

ADJ1 R. S. Simmons, USN
VXE-6 Quality Assurance

See next letter

NAS Whidbey – HOLY HARDHAT! The omnipotent eye of ye olde aviation safety officer has detected that there is no helmet adorning the head of this F-4 driver (perhaps even the RIO?). I hope they do not encounter turbulence, ejection et al. This is indeed a strange aviation safety poster i.e. October/ APPROACH – back cover or p. 50.

Michael G. Kelly, USNR
NARTU ASO

• It's an illusion! At first glance we got the same impression. However, after closer examination, what appears to be the head of the pilot, sans hardhat, is apparently a unique shadow pattern within the cockpit. (Either that or a bonafide ghostrider in the sky.)

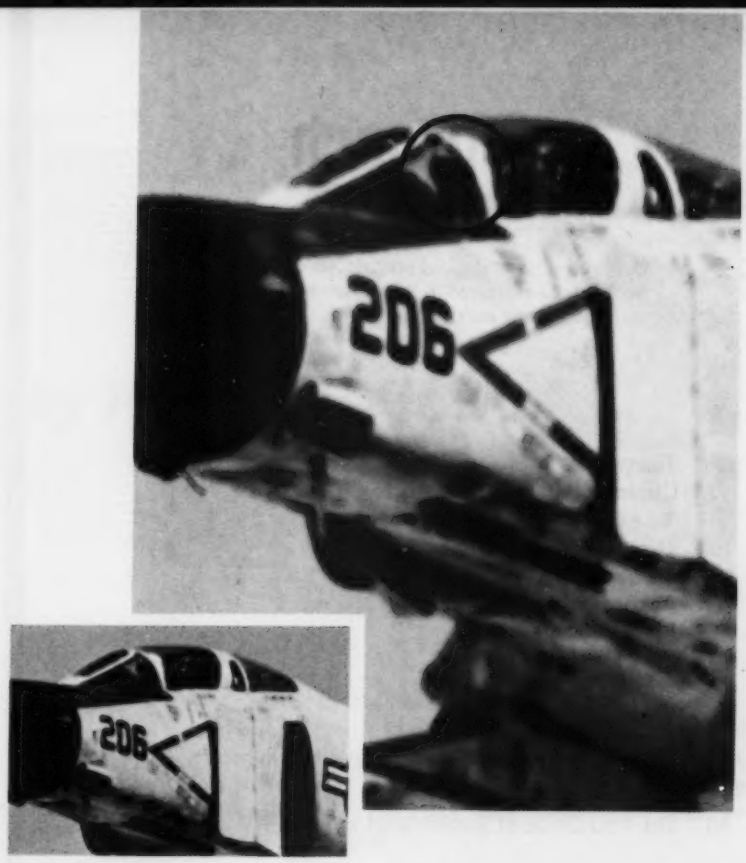
The pilot's hardhat and visor are visible just below the windscreen canopy bow and above the instrument glare shield (see details in photo inset).

We congratulate you on your keen observation of safety material published in APPROACH. Comments were received from the West Coast, the training command, and as far away as the Antarctic, but none from our East Coast comrades.

Appreciation

FPO, New York – Blake Rader's conception of a C-1A aircraft on the cover of the November APPROACH was viewed with much pleasure and appreciation at this command. Supplying the fleet with mail, passenger service, and vital maintenance parts, is VRC-40's primary mission. It was extremely gratifying to the men to see their job and squadron acknowledged in this way.

R. C. Brummage
CO, VRC-40



• Seeing the COD circling overhead waiting for a "Charlie" causes even the most hardened bos'n mate to murmur words of appreciation. It was *our pleasure* to direct attention to a group so deserving of praise for their around-the-clock support of the Fleet.

It is gratifying to the artists here at APPROACH to know their work is appreciated. Thanks for making Blake's day.

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RADM W. S. Nelson
Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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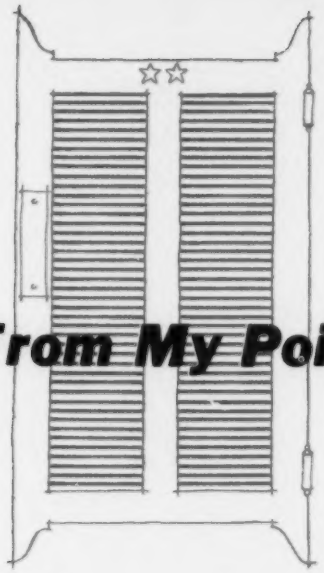
Credits

This month's cover painting by CDR Floyd Sykes pays homage to one of the Navy's staunchest little aircraft, the OS2U. For more on the *Kingfisher* check out "A Page From History" beginning on page 16. **IFC Photo:** LT W. J. Dandalides. **Pg 14-17** Story and photos courtesy of the USS NORTH CAROLINA Battleship Commission, Wilmington, N.C. **Pg 28** APPROACH diagram by Don Lips. **Pg 36** Photos: PHC Ray Painter, NAS Pax River. **Pg 44** Photo: PH2 Charles Norden.



From My Point of View

Of Tigers, Bulls and Reluctant Dragons

I CONFESS to some concern upon first reading the "mechanicals" (we no longer get "galley-proofs") of Robert Duncan's clever article which appears in this issue ("Grow Old Along With Me," pg. 40).

At first blush it seemed to smack slightly of "Casper Milquetoast," whom older readers may remember as a sort of middle-aged Linus who had to screw his courage up tight before furtively filling his fountain pen from the inkwell in the post office lobby. Upon inquiring, however, it turns out that the author flew fighters during WW II (and later in the Reserves) and instructed instrument flying back in the days when you had to plow through the stuff – all the way. I suspect he considerably understates his capability in order to make his real point – "Acknowledge the limitations of yourself and your bird and live to fight another day."

Truth is, of course, that the great naval air victories of WW II and Korea, the later day strikes through the frightful flak over Hanoi, and the Sea Wolf/Black Pony close air support of night operations in the Delta (to name a few) have all been the accomplishments of tigers, not pussycats or reluctant dragons. Nor does peacetime naval aviation safety in any way mean flying straight and level, avoiding the weather, or sniveling out of the last night launch.

Naval aviation was originally sired, and down through the years has been led and sustained, by "tigers." As Mr. Marlin Perkins tells it, however, "a real tiger won't attack a rhinoceros just for the hell of it, any more than he will sleep on his back in lion country." This distinction should apply also to the G-suited specie.

Seems to me that the image and philosophy of aviation safety is wonderfully illustrated by the story of that magnificent, battle-scarred old bull standing on the hilltop and counseling his over-eager young protege: "No, son, let's *walk* down there and we can . . . . . them *all*."

Super Simulators

AS a sort of follow-on to last month's article on the NCLT (Night Carrier Landing Trainer) we visited Fort Rucker, Alabama a few weeks ago.

That somewhat (to say the least) remote location is the home of the Army's Aviation Safety Agency as well as the site of their advanced helicopter training, which encompasses instrument flying and weapons employment.

Of particular interest was their experience with their new UH-1 flight simulator. Using two control groups of students they have demonstrated that actual flight hours can be reduced by one-half to two-thirds, by substituting simulator time for aircraft time. All concerned are extremely enthusiastic, and I expect we in the Navy are going to hear much more concerning simulators as aircraft become costlier and money more scarce.

Incidentally, our files here at the Naval Safety Center fail to disclose a single fatality or major accident involving flight simulators.

W. S. NELSON

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